ELECTRICAL REVIEW

Vol. CXLVII 1st SEPTEMBER 1950 No. 3797

Managing Editor: HUGH S. POCOCK, M.I.E.E. *Technical Editor:* W. O. FENWICK, M.I.E.E.
Industrial Editor: J. H. COSENS *Technical Consultant:* C. O. BRETTELLE, M.I.E.E.

IN THIS ISSUE

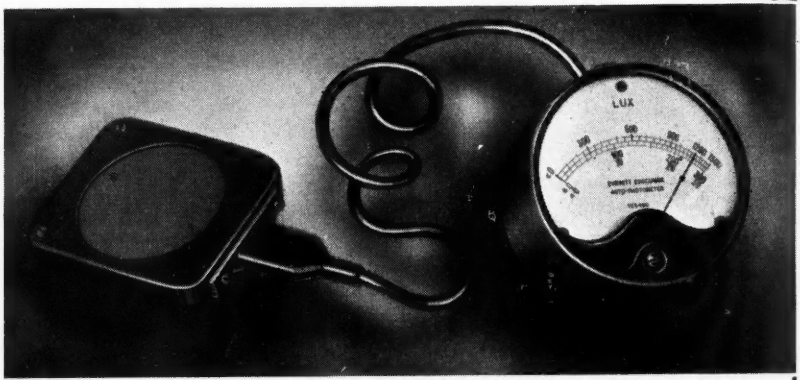
Preserving Amenities	351
Modern Shoemaking	353
News from Australia	358
Views on the News	359
Correspondence	360
Tax on Light Fittings	360
Manufacture in Scotland	361
New Books	364
High-Voltage Schering Bridge	365
Fluorescent Street Lighting	366
Personal and Social	368
Fan Drives. *By "Sash Bar"*	371
Refrigeration Compressors	374
Locomotive Shed Lighting	376
Commerce and Industry	377
Recent Introductions	381
Financial Section	383
Italian Overseas Trade	386
Danish Electrical Trade	386
Electricity Supply	387
New Patents	389
Contract Information	391
Classified Advertisements	73
Index to Advertisers	86

EDITORIAL, ADVERTISING & PUBLISHING OFFICES: Dorset House, Stamford St., London, S.E.1. Telegraphic Address: "Elecrev, Sedist, London," Code: ABC. Telephone No.: Waterloo 3333 (60 lines). Entered as Second Class Matter at the New York, U.S.A., Post Office. Annual Subscription: Home and Overseas £3 6s. 0d.; U.S.A. and Canada $11.00. Cheques & P.Os. (on Chief Office, London) payable to ELECTRICAL REVIEW PUBLICATIONS LTD. and crossed "Lloyds Bank."

A COMPLETE RANGE

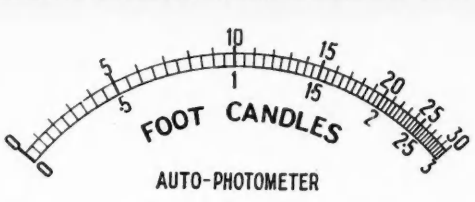
of *Photometers*

VISUAL AND PHOTOELECTRIC



Above: *Autophotometer Model II. Portable Pattern with separate test surface for direct measurement of illumination. Send for Sheet 464A.*

On right: *Typical scale showing sensitivity at low illumination values.*



Everett Edgcumbe Photometers are in world-wide use, both in Industrial and Educational Establishments. Apart from specially adapted patterns, the available range includes:

'LUXOMETER' Visual Photometer, for brightness and illumination measurements.
'AUTOPHOTOMETER' Photoelectric Pattern as illustrated.
'CUBE' Integrating Photometer for lumen measurements.
'POLAR CO-ORDINATE' Photometer for light distribution measurements.
'BENCH' Photometer for fundamental measurements against standard lamps.

Makers of electrical instruments for indicating, recording and controlling; photometric apparatus; process controls.

EVERETT EDGCUMBE

DHB

COLINDALE WORKS, LONDON, N W.9. Tel: COLINDALE 6045

ELECTRICAL REVIEW

Vol. CXLVII No. 3797 1 SEPTEMBER, 1950

THE OLDEST ELECTRICAL PAPER • ESTABLISHED 1872

Preserving Amenities

WHO SHOULD BEAR THE EXTRA COST?

IN their endeavours to carry out their duty to provide sufficient power to meet the rapidly growing demand and to extend their services in country districts the British Electricity Authority and the Electricity Boards constantly encounter opposition. Nearly always these authorities are represented as Philistines who care nothing for the effects of their works upon the beauties of Nature, and sometimes it is even implied that they are deliberately destructive of amenities. Thus electrical development is made to appear to be a struggle between the forces of light and darkness—a strange inversion of rôles.

Rural Dwellers' Rights

The battle between the electricity authorities and the "preservation" societies proceeds without much regard by the latter for the people most intimately concerned—the would-be users of electricity. Amid the din of conflict insufficient attention is paid by the preservers to the voices of rural councils, farmers and other dwellers in the country. It is true that they half-heartedly recognize the right of these people to the benefits of electricity but to them beauty comes a long way before utility.

All right-minded people share the desire to prevent unnecessary destruction of scenic values and nobody more than the electricity supply authorities. Every possible concession is made to the views of planning authorities and organizations for the protection of natural beauties. They realize it to be part of their duty to the public but, after all, their reason for existence is to supply electricity to everyone who wants it. This is where the British genius for compromise is stretched to the utmost.

Overhead or Underground?

So far as distribution is concerned, the solution recommended by the protectors of the countryside for all problems is underground cables. Unfortunately cables are a most expensive substitute for overhead lines; rarely can they be installed at less than three times the cost and in hilly country the increase is likely to be considerably greater.

This introduces two main considerations. The first relates to the cut in expenditure imposed upon the Electricity Boards. The Boards are compelled to reduce the cost of extensions to get the utmost from their smaller allowances. The alternative is to deprive many people of the service to which they are entitled.

But even when the need for capital restrictions diminishes or disappears the cost of underground distribution will be prohibitive if it has to be borne by the people to be served. It may be argued that the cost can be spread over the whole of a Board's consumers. The geographical structure of the Electricity Areas was designed to secure a fair balance between urban and rural districts. In some Areas this may enable

the burden to be spread without adding unduly to the general cost of electricity but in others, notably the Eastern and South Western, this seems to be impossible. It has been suggested by the Friends of the Lake District, among others, that the extra expense involved should be met from a national pool. It seems reasonable to adopt this course, first making sure that there are "amenities" to be preserved.

CROSS-CHANNEL TELEVISION

Engineers responsible for the B.B.C. television service have triumphed again. For some ninety minutes on Sunday evening last, viewers in the London and Birmingham reception areas watched incidents of the Calais fête, in part celebration of the centenary (referred to last week) of the first cross-channel submarine telegraph cable. Everything was admirably devised and the results were most pleasing. The experiment, the first Anglo-French effort of its kind, was to be repeated on Wednesday last.

FARM ACCIDENTS

At this time of year there are invariably reports of electrical accidents on farms caused by elevators or other equipment coming into contact with overhead lines. In a recent case, which occurred in Scotland, a horse was killed when a rick lifter touched a 6 kV line. The *Glasgow Herald* puts the height of the line above ground level at 20ft. It is possible for humps and other irregularities in the ground to reduce the effective clearance and it is impracticable to draw up regulations to meet such conditions. Nor is it feasible to stipulate that lines must be higher than the greatest possible extension of elevators. Is it possible for rural representatives of the Electricity Boards to do more to warn farmers and their workers so that they may take precautions?

EXPORT VOLUMES

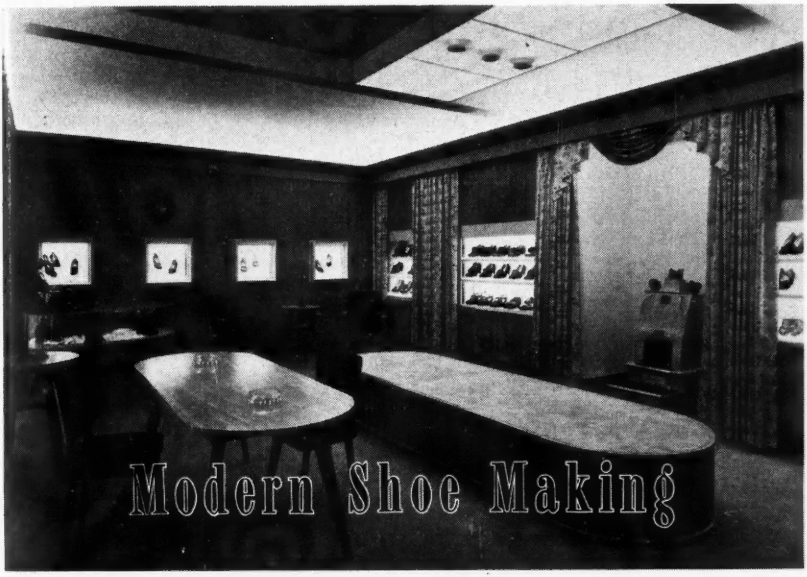
In general it is possible to give values only of electrical exports month by month but periodically the *Board of Trade Journal* publishes some particulars of volumes. The latest figures available cover the first half of this year and monthly averages are compared with those for 1949. As regards exports of electric wires and cables it is shown that the monthly average for January-June this year was 9 per cent lower than the average for last year. At the same time exports of telegraph and telephone equipment showed a rise of 11 per cent. Electrical machinery exports were 12 per cent higher and shipments of boilers and boiler house plant 4 per cent more. In view of the varied nature of electrical goods and apparatus an overall figure of volume is not easily arrived at; the monthly average value for the first half of this year was, however, 3 per cent above that for 1949.

INDIAN ECONOMY

One of the main preoccupations of India—which recently entered the fourth year of its independence—is to raise the very low standard of living of its people. This it seeks to do by means of industrial development; at present some 70 per cent of the population is dependent upon agriculture for a living. Electricity is largely concerned in this industrialization and the opening earlier this year of the National Physical Laboratory at New Delhi was an important step forward in this field. Mr. H. R. Varma, project officer of the Central Electricity Commission, Simla, in a recent article in an Indian technical journal, showed that at present only 0.23 per cent of rural towns and villages have an electricity supply. The difficulty is that until the standard of living is raised few could afford the amenity if offered.

COOKER DIVERSITY

It is accepted here that the electric cooker provides a well-spread load. Tests in New York, recorded in the *Electrical World*, showed how great the diversity is. The occasion was a cooking contest in which 100 cookers, representing a connected load of 1,170 kW were used, connected in four circuits. A peak half-hour demand of 450 kW was expected but, in fact, the highest point proved to be only 83 kW. The diversity factor of 14 was worked out on the results from the four individual circuits. It is thought that the figure would have been much higher if the four circuits had been metered together.



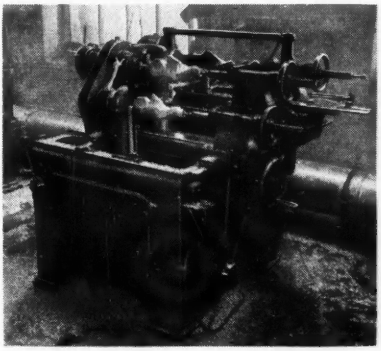
Old-Established Firm's Production Policy

ALTHOUGH C. & J. Clark, Ltd., footwear manufacturers, celebrate the 125th year of their existence this year, they cannot be accused of being old-fashioned in their outlook. In fact, their four factories at Street, Bridgwater (two) and Shepton Mallet employ the most modern production machinery and latest technique. Modernization of methods, calling for the much greater use of electricity, has been particularly rapid since the end of the war and at the original (now much enlarged) factory at Street 1,500 electric motors have been installed during the past four or five years. In addition, showrooms with exceptional illumination facilities have been provided and simultaneously the other factories have been equipped with extensive electrical installations.

With the installation of the new motors at Street, all shafting and group drives have now been eliminated except in two unimportant cases. If new machinery on order has been delivered these, too, will possibly have disappeared by the time this article is published. Virtually every machine therefore now has its own individual drive. The resulting beneficial effect on the electrical load of the factory is accompanied by other maximum demand reducing devices. Apart from the

Above : Cornice lighting in the new showroom is supplemented by fluorescent tubes fitted in ceiling louvres and by spotlights

Right and left lasts are produced entirely automatically by means of this machine



provision of a B.I.C.C. automatic power-factor correction installation, 100 kW and 135 kW d.c. generators (E.C.C.) are run from steam, which is then used for process work and heating. There are also three 165 kW Brush diesel generators, two d.c. and one a.c., which are energized from the mains, being normally used only at peak periods. Some of the machinery used in the factory is run on d.c. and to supply this from the mains two 200 A mercury vapour bulbs (E.C.C.) have been arranged in parallel. As standby in case of failure of the main supply a 250 kW Belliss & Morcom a.c. generator is to be installed shortly.

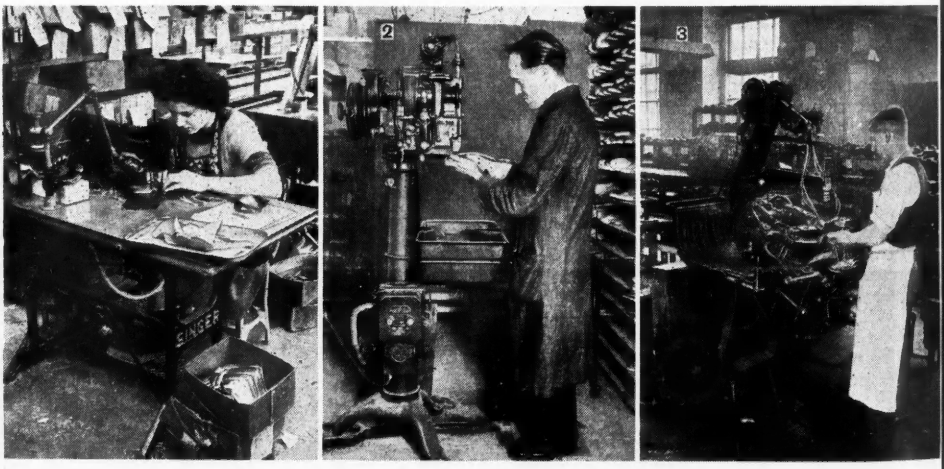
The supply from the South Western Electricity Board is received at 11 kV a.c. and reduced to 400 V by three 400 kVA Hackbridge transformers. Crompton Parkinson oil-immersed circuit-breakers control the incoming supply, while a twelve-panel Ellison switchboard covers the 400 V a.c. supply. The latter board was erected by one man and a boy in twenty-four hours.

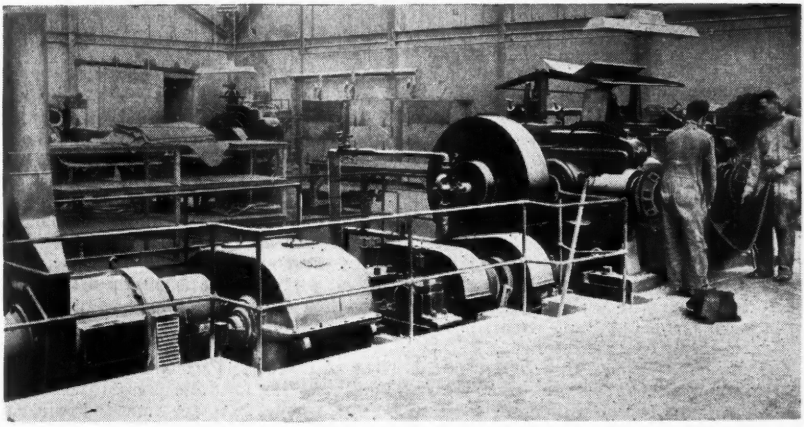
At Street, four main types of shoes are manufactured—women's light welted and cemented, children's machine sewn and sandal veldts. One factory at Bridgwater handles slip-last and stuck-on types, while the other produces ladies' warm-lined boots. At Shepton Mallet children's shoes exclusively are produced. The tracing of the manufacture of the welted type will cover most of the processes involved and indicate the large number of points at which the employment of electrical aids is indispensable in large-scale production. It will be realized, of course, that for production on this scale shoemaking is broken down into a large number of small operations and only the most important can be mentioned.

Before the actual manufacture commences a great deal of preparatory work has to be carried out. One of the most important jobs, on which the whole success or failure of a shoe depends, is the making of the lasts or formers on which the shoes are built up. Pieces of prepared maple, being first turned to roughly the required shape, go to a machine which produces a right and a left last simultaneously in about 3½ minutes. These lasts, which are made in both hinged and screwed types, are then cut in half, drilled, trimmed, polished and fitted with metal sole plates.

A heavy electrical load is taken by another preliminary process, namely, the preparation of the rubber used in manufacture. Altogether, for the mixing of the ingredients, the rolling into sheets, vulcanization and the pressing out of

(1) Closing the heels; note the 12 V needle spotlight (2) Nailing the insole to the last (3) The upper is pulled over the last and secured to the insole by means of seven tacks all in one operation





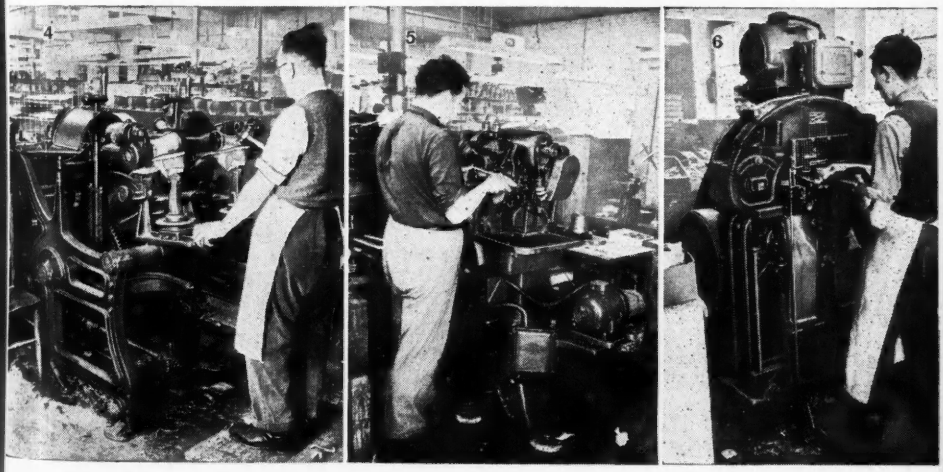
A 100 h.p. motor is used on this mixer in the rubber department of the works

soles, the rubber department has a connected load of about 160 kW, the greater portion of which is represented by a Banbury mixer driven by a 100 h.p. Brush motor. Further demands for electricity are made in the adjoining departments where rubberized and other lining materials are produced and where the various fillers and rubber solutions used in course of manufacture are prepared.

The making of the special knives for cutting the leather and rubber into required shapes also needs electrical assistance, as does also the manufacture of the shanks or springy steel strips for reinforcing the insteps, a Wild-Barfield tempering furnace being among the equipment utilized for the latter process.

The actual manufacture of the shoes can be said to commence with the cutting

(4) Bottom-rolling sandals to obtain correct shaping (5) Stitching on the insole to the upper (6) Pressing the leather heels after formation reduces their depth by one-third



out of the leather for the uppers. The cut pieces of leather are first skived around the edges to make them thinner for "turning-in," after which the linings and taping are attached. The front and back portions are then stitched together and eyelets, if any, are inserted. In view of the intricate work involved, practically all the machines in the closing department, as this section is called, are fitted with 12 V spotlights on the working area.

Meantime the inner soles or insoles, after cutting and grading, are rounded and channelled preparatory to producing lips to which the welts are attached. Electrically heated tape treated with latex is stuck on to reinforce these lips. The insoles are then tacked on to the lasts while the uppers are placed in a steaming oven to soften them. A stiffener is inserted between the upper and the lining, a machine then pulling the upper over the last and securing it to the insole by means of seven tacks all in one operation.

When the uppers have been further secured by lasting the sides with the aid of the appropriate machine, a "bed laster" draws the toe into shape by means of a copper or steel wire running between the side staples. In turn a stapler removes the wire and inserts staples. The "seat" or heel part of the shoe is similarly lasted, also by machine.

After scouring, trimming and smoothing the bottom, the welt is stitched on and all staples are removed. Trimming off the waste then follows and the welt is hammered out flat. A steel stiffener or shank is inserted ready for building up the bottom with a thermo-plastic filler. This done, the shoe is ready for fitting the sole.

The soles meanwhile have been stamped out, on presses actuated by foot control. It is here that one of the few last remnants of group drive is to be found, ten machines being operated through shafting by a 25 h.p. motor. A commencement has, however, already been made on changing over to a new type of press which is individually driven by a 5 h.p. motor and is three times as fast as the old machines. In the case of rubber, the soles are ready for attaching to the shoe, but the leather soles, after cutting from previously hammered leather, have to be graded, various machines then cutting them to the smallest thickness, stripping, skiving, bevelling the welts and roughening.

In some shoes the soles are simply stuck on, but in most cases they are stitched as well. The first layer of crepe rubber soles is stitched on, the second stuck. Leather soles before being attached to the shoes are immersed in warm water for an hour to soften them.

For stuck-on soles a light-head rotary sole-laying machine simultaneously applies heat and pressure: it can handle about forty-five pairs of shoes an hour. Stitched shoes, after the soles have been trimmed, have their welts opened and the soles are then stitched to the welts. Nailing of the back part of the shoe follows and a rolling machine presses the sole to shape. The lasts are removed and the fixing of the heels is done on the machine which automatically inserts six nails simultaneously.

The leather heels are previously built up in layers held together by four nails. A press then compresses the layers often reducing the depth by one-third and the final layer is fitted. Wooden heels and also wedges are produced in a special department, the wood first being cut into blocks and then planed and machined to shape. The bottoms are gouged and nails are put in for strengthening.

When leather-built heels have been nailed on, they are pared, scoured and coloured. Wooden heels are covered in a separate department before being attached to the shoe. Automatic machines equipped with l.v. electric heating set the edges of the shoes. After removal of the lasts, the socks are inserted and the soles are electrically branded with sizes, etc. The trimming of the lining and cleaning up generally completes the shoes except for stapling on trimmings, adding the laces, ironing out creases and in some cases spraying the uppers to freshen them up.

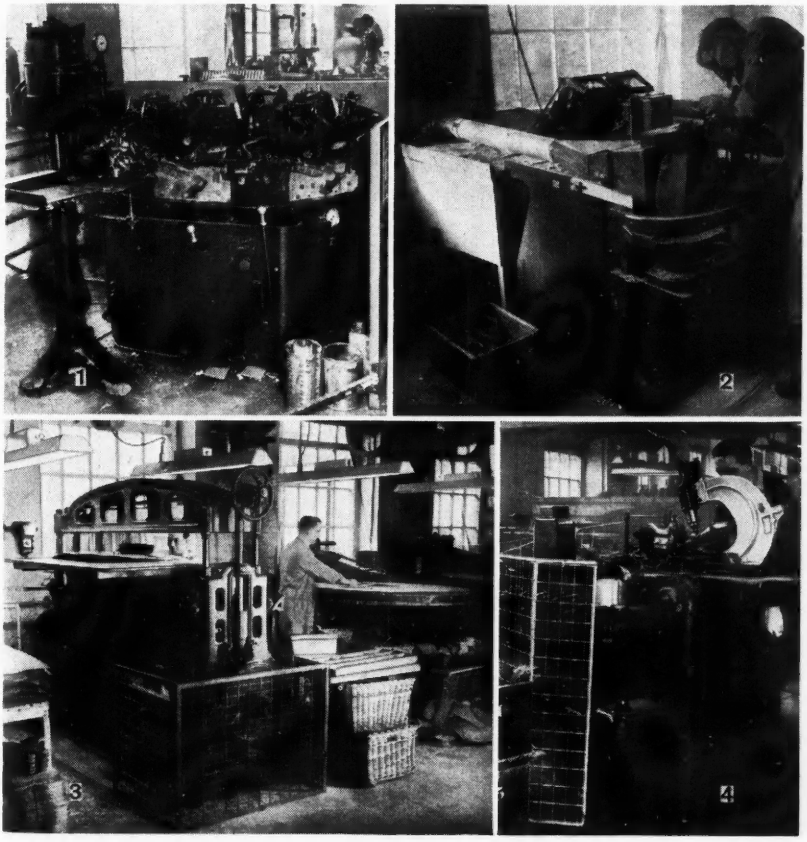
The making of sandals is a considerably simpler job than that we have described. As they have no welts many operations are eliminated. The upper is first stapled to the leather-and-crepe combined insole and then stitched. The sole is then cemented on under pressure. After paring, smoothing and polishing, the staples are taken out and the sandal is stained and trimmed.

Many of the cardboard shoe boxes are made on the premises and one interesting point is that the presses on which the cardboard is cut are not bolted but stuck on to the floor. Conveyors will shortly be installed connecting the making departments with the warehouse and packing department.

Altogether throughout the factory there are about 4,000 h.p. of motors ranging from the 100 h.p. Brush unit in the rubber department to the ⅓ h.p. Singer motors used on the various machines in the closing room. In general, motors of ½ to 2 h.p. are of Crompton Parkinson construction, the 3 and 4 h.p. units were made by Metropolitan-Vickers Electrical Co., Ltd., while Laurence, Scott & Electromotors, Ltd., were responsible for the larger motors as well as for some of the fractional h.p. units. Lancashire Dynamo & Crypto, Ltd., supplied geared motors for the stitching machines. Rearrangement of the plant is greatly facilitated by the widespread use of B.I. Callender's connection boxes.

The three new showrooms just opened provide outstanding examples of modern

(1) Rotary sole-laying machine for stuck-on soles (2) Moulding wooden heels (3) Cutting out the soles. The individually driven type of machine on the left is gradually replacing the old group-driven presses on the right (4) Automatic edge-setting machine



illumination for display purposes. In one of them seventy-two 5ft fluorescent tubes concealed in aluminium louvred ceiling fittings give a general lighting intensity of 100ft-candles. Additional fluorescent lighting from 5ft or 2ft tubes is provided in the shadow boxes and display window, with indirect floor standards for decorative effect. A somewhat similar scheme utilizing forty-four fluorescent tubes has been adopted for a smaller room.

The principal lighting of the third room comes from the cornices where eighteen 5ft fluorescent colour-matching units have been fitted. In addition, directly above a mannequins' stand, are eight 5ft fluorescent tubes behind louvres and three spotlights, with ten Courtney Pope "Hiliter" fittings with 150W B.T.H. tungsten lamps mounted just below the cornice on one side of the room directed to foot level. Illuminated shadow boxes and a demonstration window display are also provided here. To eliminate noise all the control equipment for the fluorescent tubes has been installed in the basement beneath the showrooms, which are also air conditioned.

Another illumination feature is to be found in a new factory block for light-felted shoes just completed. Here 290 high-level twin fluorescent units are employed, and one section is composed of the new 8ft fluorescent tubes.

Further items of electrical interest installed are a 150-line Siemens automatic telephone exchange, a Julius Sax staff location system and International Time Recorder time-keeping apparatus.

All the electrical installation work in the factory is carried out by the company's Contracting and Engineering Division. We thank Mr. L. A. Leavey, the head of Clark's electrical section for his assistance in preparing this article.

NEWS FROM AUSTRALIA

From Our Own Correspondent

THE Victorian State Electricity Commission's fourth Kiewa-Morwell loan of £3 million has been over-subscribed. This loan was the largest ever floated by any State authority in the history of the Commonwealth.

An order has been placed with the English Electric Co., Ltd., for the supply and delivery of 17 electric locomotives for use on the Gippsland line of the Victorian Railways at a cost of £1,316,000. The South Australian Railways have ordered from the same company diesel engines and electrical equipment for the construction of 10 diesel-electric locomotives, which will be locally built.

The Queensland Government now plans to buy 10 diesel-electric locomotives.

Although the Tasmanian Government is to spend a matter of £3½ million on modernization of the State's railways, it is stated that proposals for main-line electrification cannot yet be entertained because of the relatively low traffic density.

Work has commenced on the erection of a new power station at Shepparton, Victoria, the first of two country diesel power stations to be built as part of the State Electricity Commission's general programme of expansion. Construction on the other station—at Warrnambool—will begin in about a month. These two stations will each contribute more than 10,000 kW to the State supply system.

The Federal Council of the Electrical, Radio and Telephone Manufacturers of Australia is making representations to the Federal Government against radio valves being singled out for special taxation. The Council declares that the excise tax on radio valves is a special, selective, discriminating nuisance tax. The present excise tax and "war loading" on radio valves is 2s 9d.

A deputation from the Australian Society of Engineers recently waited on the Western Australian Minister for Works and urged the licensing of all electrical linesmen. Members of the deputation said that the setting of a standard of competency for linesmen would minimize the danger to themselves and to the general public. Licensing would give the men added status. It was recommended that to qualify for a licence a trainee linesman should spend twelve months on the ground as an assistant linesman, six months at a school and six months with a licensed linesman before sitting for an examination. The Minister agreed that the matter should be investigated "as there is a need to have competent men handling electricity at any stage."

VIEWS on the NEWS

By REFLECTOR

MANY of my older readers will have pleasant recollections of the Electro-Harmonic Society and particularly of the late Mr. Tom Gatehouse (of the *Electrical Review*) and his violin. Since the Society came to an end some years ago I have heard little about musical activities among the electrical fraternity. This thought is raised by a note in the *South African Electrical Review* on Mr. A. R. Sibson, city electrical engineer of Bulawayo, who was associated with the foundation of the Bulawayo Municipal Orchestra, and is a member of the S.A. Society of Composers. He has written many orchestral compositions which he has presented in various centres.

★ ★ ★

About a year ago the *Electrical Review* published a brief article on the farm which the General Electric Co., Ltd., runs in association with its Coventry Telephone Works. Mention was made of the herd of attested and accredited pedigree Jersey cows kept there. Recently members of this herd have secured first, second and reserve prizes at the Walsgrave (Warwickshire) Show in the "best Jersey cow or heifer in calf" class. Pigs are also raised on the farm and one of them was adjudged the best bacon pig at the Walsgrave Show. I do not suppose that the company's improved results for the past year can be attributed entirely to this useful sideline.

★ ★ ★

A correspondent has dug up an old newspaper cutting (1879) reporting a meeting of a local gas company. At this the chairman said that he had inspected the "new light by electricity" in London. He saw no fear whatever of gas being superseded by electric light.

"The system was a most expensive one; the least hitch in the machinery stopped it and there were other little matters calculated to interfere with the light." Moreover, the light was unpleasant and "in one instance where it was used the employees had informed the masters that they must either find other men or a different place to work in." Other adverse factors were mentioned and the argument was clinched by the statement that in the engine room itself gas lighting was used.

★ ★ ★

Lampreys always recall to me the fate of King Henry I who expired after eating too many of them. They are in the news again because they have been attacking trout in the Great Lakes of America. The *Manchester Guardian* says that Federal action is being taken against them. Electrical methods are being employed including "radar-type instruments, anti-submarine generators and bright under-water lights; sound waves produced by sonic generators tuned to the heart-beats of the lampreys will kill them easily." The difficulty will be to keep the trout away from these devices but scientists believe that it can be done by timing and selecting the right means.

★ ★ ★

"Do as you would be done by" should be the guiding principle of Electricity Boards. Yet, if a correspondent in the *Sunday Express* is to be believed, one of their number has failed to act up to it. Signing himself "Hotelier," he says that the local Electricity Board has given him three weeks in which to settle its account, failing which he will be cut off. But nine weeks ago he accommodated some representatives of the Board, at its request, and is still waiting to be paid.

★ ★ ★

From an A.S.E.E. branch report: "We had a discussion on members' problems. The questions were varied and concerned motors, lifts, batteries, plug fittings, etc. One involved the death of a person through inserting an ordinary 2-pin and earth 5 amp plug into a 3-phase socket." This was evidently a lethal, not a vital, question.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents

Guarding Machinery

THE article in your issue of 18th August by Mr. F. E. Sugden entitled "Guarding Machinery," touches a very important point in the interpretation of the requirements of the Factories Act, 1937, and as a maintenance engineer with a particular interest in safe working in industry, I feel that the judgment quoted in the Court of Appeal is absolutely correct. It is suggested, however, that in so far as accidents on press tools constantly recur owing to inadequate interpretation by managements of what constitutes efficient guarding, the following additional note may clarify the position somewhat.

The Factories Act, Section 14, stipulates that dangerous parts must be protected by *fixed guards* unless operation is not possible with fixed guards, in which case a guard must be fitted which "*automatically* prevents the operator from coming into contact with that [dangerous] part." The operative word is "automatically," and for many years now reputable press-tool manufacturers have been supplying automatic guards which prevent the machine from being started when the guard is open, and which cannot be opened while the machine is in motion.

It must be added that, although Subsection (2) of the same Section makes provision for the stipulation of a specific class of safety device by the Secretary of State in special cases, to the best of my knowledge no such regulation has been made for press tools, so that it remains incumbent upon the occupier of the factory to consider fixed guarding first, and not to assume that an interlocked guard will cover every job on a given press tool.

I would suggest, therefore, that Mr. Sugden's remarks upon the steps necessary to secure compliance with the regulations by employees should be amplified somewhat. The occupier should see to it that a machine cannot be operated without using the guard and particularly that the means adopted to secure these conditions are subject to regular and frequent inspection and testing. Only in these circumstances, which must leave little room for doubt that the operator has wilfully interfered with mechanisms, can the occupier expect to receive sympathetic treatment under Section 137.

S. C. HERBERT, B.SC. (ENG.),
A.M.I.MECH.E., M.INST.GAS E.
*London, S.E.*22.

Tax on Light Fittings

AS the result of further consultations with the Electric Light Fittings Association, the Commissioners of Customs and Excise have decided that the following information regarding laylights and louvres shall be substituted for that published in the *Electrical Review* of 17th March last:—

2. Laylights, etc.—*Not Chargeable.*— (a) Laylights, designed to be built into, and form part of, the ceiling, whether decorative or plain and whether glazed or louvred, having a superficial area of not less than 21 sq ft for the complete laylight. (b) Industrial reflector fittings, i.e., fittings without decorative features, and designed, advertised and sold exclusively as industrial fittings, made to recess into the ceiling, whether open or louvred, or glazed with clear glass or clear plastic. *Chargeable.*— (c) Recessed fittings other than those described above. (d) Suspended laylights and "box" fittings. (e) Fittings attached to the underside of laylights as boxes, ceiling fittings or pendants, whether the laylight itself is chargeable or not.

3. Louvres. — *Not Chargeable.* — (a) Plain louvres sold as part of industrial metal trough reflectors. *Chargeable.*—(b) Louvres sold separately. (c) Louvres sold as part of any fitting other than reflectors described in paragraph 3(a). (d) Where a louvre or diffusing attachment is sold with a plain basic lighting unit, except in the case of reflectors described in paragraph 3(a), tax is chargeable on the fitting as a whole irrespective of whether or not the unit is chargeable when sold separately.

Lighting fittings accessories sold separately are not chargeable with tax unless they constitute a chargeable fitting in themselves, e.g., galleries which are (a) complete with hooks or loops or (b) combined with a ceiling plate or (c) designed for fixing direct to the ceiling. Accessories sold together in association to comprise a complete or substantially complete fitting of a kind used for domestic or office lighting are chargeable with tax.

Manufacture in Scotland

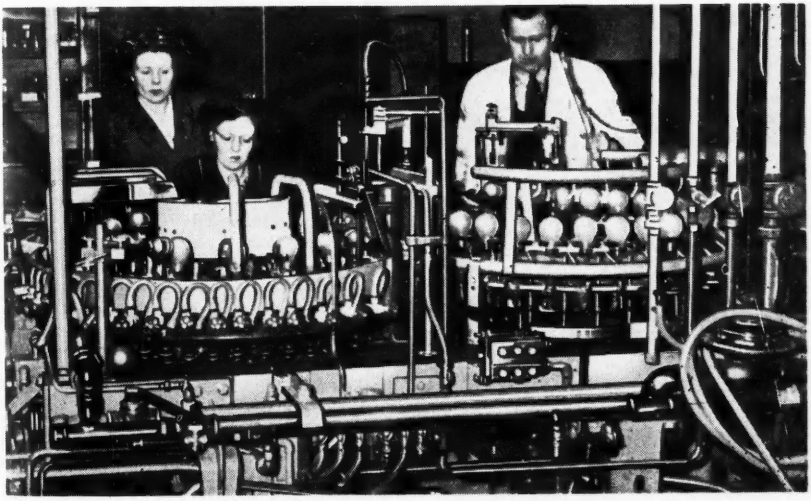
Expansion and Reorganization of Philips' Works

THE establishment by the Philips Organization of a large new factory at Hamilton, Lanarkshire, has permitted a considerable expansion and reorganization of manufacturing arrangements. When Philips' Hamilton Works, Ltd., commenced production in November, 1945, work in the 160,000 sq ft section of the factory then completed was confined solely to the production of radio components and set assembly. This arrangement was continued until last September when radio set assembly was discontinued. In the meantime the manufacture of tungsten and gas discharge lamps has been transferred from London and that of fluorescent lamps from Blackburn, while the first of three 50,000 sq ft extensions has been opened for the production of "Philishave" electric shavers, radio components and cycle lighting sets.

The second extension recently completed will be used for transport and stores. No decision has yet been made as to the use of the third new building which will shortly bring the total floor area available to 350,000 sq ft, but it is possible that it may be employed to help meet the growing demand for television apparatus. There still remains plenty of room on the 40-acre site for further extensions.

Electronic, radio and electric lamp manufacture is something quite new for the district. When the factory was started only a very few key personnel were brought there and it speaks well for the adaptability of the local labour that over 700 men and women are now performing satisfactorily the numerous

Lamp making machinery in operation at Philips' Hamilton Works



skilled and intricate processes which work of this type involves. It is expected that double the number of employees will be required when all the extensions are in full use.

Automatic high-speed tungsten lamp production units have been laid out, each turning out well over 1,300 lamps an hour. The whole process is continuous, the various machines and operations being carefully synchronized to secure a smooth uninterrupted flow right from the making of the feet to the testing and subsequent packing of the finished product.

In the foot-making machine the rod glass, stem and two lead-in wires are fused and squeezed together to form a gas- and air-tight joint, a hole (later sealed) being blown through the base to enable unwanted gases to be exhausted. The lead-in wires are in three sections: the piece going inside the lamp is of nickel, that in contact with the glass is of nickel-iron coated with copper, while the portion making the electrical connection is of copper.

After cooling sufficiently for unloading, the lamp feet are annealed in a rotary oven, from which they come automatically on to the mounting mill where the filament is added. Here the ends of the nickel portions of the lead-in wires are flattened and small vees formed in them. The tungsten filaments placed in serrations on a revolving drum are picked up by vacuum on to an arm which puts the ends on to the flattened vees of the lead-in wires.

Balancing electric shaver armatures

The ends of the filament are then automatically pushed out of the way and the end of the glass rod is heated. While the glass is still molten the ends of the molybdenum supports are inserted and cut to length. The filament is then pushed back into place, the ends of the molybdenum supports being looped over.

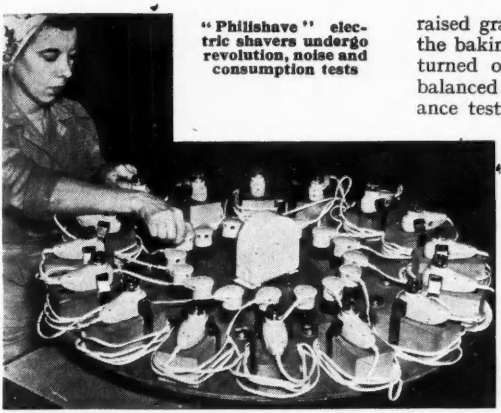
Loaded automatically on to a transfer conveyor, the completed lamp interior assemblies meet the glass bulbs, already stamped, travelling on another conveyor going in the opposite direction. Combined, the units are loaded automatically on to a sealing machine where the bulbs are melted on to the feet, at the same time being shaped and cut. The lamps are then taken by transfer arms to the pump which, as the lamps travel round, alternatively exhausts and admits an inert gas. High-frequency generator units are employed to check the contents, trained operators being able to recognize faulty lamps at once by the colour of the ionized gas.

Passing on to the capping wheel, the lamps first have the caps threaded on and fixed into position with capping cement. A low voltage is then applied and gradually increased until it is considerably above the eventual operating pressure. This gradual heating up is necessary to form the crystalline structure of the tungsten. Simultaneously with this "running in" process, the capping cement is heated so that it forms a firm adhesive between the cap and bulb. The excess connecting wire is burnt and cut off and the end is soldered on to the contacts.

After a preliminary inspection, the completed lamps in trays are placed in frames where they are given short runs on both low and high voltage, as well as further high-frequency tests. Every lamp is then examined for appearance and a selection from each batch receives photometric and other electrical tests for light output, wattage and life.

Special lamps for sewing machines, vacuum cleaners, automobiles, etc., are dealt with in separate production sections.

The transfer of the fluorescent lamp manufacture from Blackburn has only recently been completed and full produc-



"Philishave" electric shavers undergo revolution, noise and consumption tests

tion has not yet been attained. On arrival at the factory the glass tubes are first examined and weighed. They are then washed, drained and dried. Coating of the insides with the fluorescent material is done by pumping a solution into the tubes arranged vertically, several tubes being treated simultaneously.

When coated, the tubes go to the baking machine where the binder is burnt out and the coating takes a firm hold on the glass. After baking, the tubes are examined for flaws and the coating is cleaned off the ends.

In general, the manufacture of the feet for the tubes is similar to that for those of tungsten lamps, but the machines used are somewhat slower. After the cathodes have been welded on to their supports, they are coated with electron emitting material. The anodes are then welded on and the feet are sealed into the tubes. Loaded into a continuous oven, the tubes have unwanted gases pumped out. After running-in, the lamps are inspected and packed.

Manufacture of the "Philishave" shaver in quantity was commenced last September. The first stage in assembly is the mounting of the rotor laminations on the spindle. The rotor is then wound and balanced both electrically and mechanically. The windings are protected by bending back the edges of the press-pahn former. When the top collector ring has been fitted, the assembly is impregnated with insulating varnish for a period of five hours, the temperature being raised gradually up to 150 deg C. After the baking operation the collector ring is turned on a lathe. The rotor is then balanced and given a preliminary inductance test, followed by a breakdown test at 1,500 V d.c., a final resistance test and a short-circuit test. To give high speed, silent running and longer life, the ends of the spindles are rolled.

In the winding of the stators it is important that the resistance should be the same in the two halves. For this reason wire from the same reel is used for both halves. When the laminations have been added to the stator, the condenser, stator, rotor and two bearings are assembled on to the frame, care being taken to match the bearings which are self-lubricating. Meanwhile assembly takes place on the other side of the conveyor of the brush holder, tension springs and the special plug enabling the shaver to be used on voltages from 110 to 250.

A jig is used for the final addition to the assembly of the rotor bearing, suppressor and spur wheel for the cutter drive. After wiring and soldering, the unit receives a 2,000 V breakdown test and is run in for fifteen minutes at its normal operating speed of 3,000-4,000 r.p.m. and is given a mechanical inspection. Assembled in its housing and mounted on rubber, the unit then has revolution, noise and consumption tests. It is then checked to see that it will start on 70 V on the 110 V tapping and on 130 V on the 250 V tapping. After a final inspection for appearance, the cutter head is fitted and the apparatus is boxed complete with cleaning brush and instructions for use.

In addition, electrical components for radio, such as wire-wound resistors, wire-wound trimmers, air-dielectric trimmers, mica, ceramic and paper condensers are made here. A self-contained section for making "Philidyne" cycle lighting equipment is arranged with two main assembly lines, one for dynamos and the other for headlamps.

We thank Mr. J. Visman, managing director of Philips' Hamilton Works, Ltd., and his assistants for their help in preparing this article.

NEW BOOKS

Phenolic Resins. Their Chemistry and Technology. By P. Robitschek, A.P.I., and A. Lewin, B.Sc., A.R.I.C., A.P.I. Published for *British Plastics* by Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Price 30s, postage 5d.

The purpose of this book is to integrate theoretical knowledge and industrial practice and provide a link between the science and techniques of phenolic resins. In selecting their subject matter the authors have excluded material not fundamentally necessary and details of less important processes and theories of dubious value have been omitted to keep the underlying concept clear. The book is therefore an explanatory digest and not a catalogue or encyclopædia.

Included and discussed are the more fundamental modern trends and developments, particularly physics and kinetics on the theoretical side and pulp-resin preforms on the technological side. There is also a discussion of the nature and meaning of tests and test results; this will provide a background for the interpretation of much tabulated material.

The book will undoubtedly be of great interest and value to technologists, chemists and students in the expanding range of industries making and using phenolic resins and plastics.—R. P.

Electric Circuit Theory. By H. Tropper, Dipl. Ing. (Vienna), Ph.D. (Lond.). Pp. 164; figs. 100; index. Longmans, Green & Co., Ltd., 6-7, Clifford Street, London, W.1. Price 15s.

Dr. Tropper's book should do a good deal to help the appreciation of circuit, as distinct from apparatus, behaviour as it deals with the analysis of the circuits made up from the resistance, inductance and capacitance of the apparatus in a simple manner. Extensive use is made of the principle of superposition to derive the more complicated effects from simple ones, and throughout the book emphasis is laid upon the physical significance of the equivalent circuits used and of the phenomena occurring in them.

The first chapter is an introduction to equivalent circuits, their components and their response to disturbance. Then follow chapters dealing with the principle of superposition and its applications; duality in electrical networks; symmetrical components; and, concluding the "steady state" part of the book, fault analysis by means of symmetrical components. The next chapter deals with the use of Heaviside's methods to determine the transient response of circuits, justification of the transform concept being reserved for the following chapter. The last chapter introduces the Laplace transform.

An unexpected technical error occurs on page 11, where the formulæ for star to delta conversion of impedances are given in the admittance form with impedance symbols.

The worked examples contained in a number of chapters are mostly symbolical rather than numerical, and no exercises for the reader are included. In a work of this nature that is perhaps a wise decision. In many respects the book provides an introduction to matters which may have to be followed up in more advanced specialized texts and selected references at the end of each chapter would have been helpful.

The book may be recommended as a concise introduction to the theory of electric circuits, and it is particularly welcome at a time when the behaviour of such circuits has become of very widespread interest.—G. L.

Books Received

Book-keeping and Accountancy for Private Companies. Fourth Edition. by Owen J. West. Pp. 188; index. Jordan & Sons, Ltd., 116, Chancery Lane, London, W.C.2. Price 10s 6d.

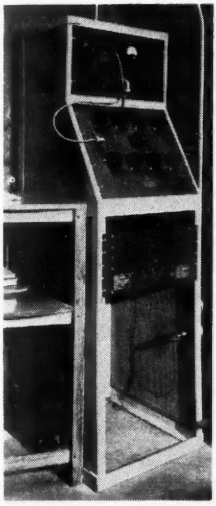
Electrical Machines. By Charles Siskind. Pp. 521; figs. 311; index. McGraw-Hill Publishing Co., Ltd., Aldwych House, Aldwych, London, W.C.2. Price 40s 6d.

Inventions, Patents and Monopoly. Second Edition. By P. Meinhardt. Pp. 320 and index. Stevens & Sons, Ltd., 119 & 120, Chancery Lane, London, W.C.2. Price 30s.

Arc Welders' Tables and Data. Edited by A. J. Coker. Pp. 144 and index. George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Price 5s.

High-Voltage Schering Bridge

200 kV Instrument at the G.E.C. Witton Works



Low-voltage portion of bridge: ratio arms, detector unit and the detector power supply unit

TO aid the work of the high-voltage laboratory at the Witton Works of the General Electric Co., Ltd., a 200 kV Schering bridge for use at power frequencies has recently been installed. This instrument, which is intended for the measurement of dielectric losses in insulating materials, power factor, capacitance, etc., was designed and made by Salford Electrical Instruments, Ltd., with a standard gas-filled capacitor supplied by the Bushing Co., Ltd.

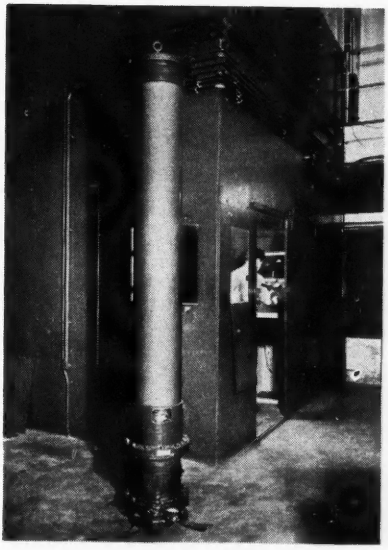
The l.v. parts of the bridge are arranged for rack mounting and consist of ratio arms, a detector unit and its associated power unit. Observation of the null condition is visual and the detector unit comprises a three-stage amplifier, thermionic rectifier and milliammeter. The first stage of the amplifier has a feedback filter to attenuate harmonics, while a parallel "T" filter in the second and third stages provides a frequency-selective feedback. Sensitivity of the bridge is varied by means of a potentiometer interposed between the last amplifier stages.

In a bridge of this type, used for precision measurements, the constructional details and, in particular, the disposition of the components are of considerable importance. Cathode follower networks have been employed between the bridge, test specimen and the standard capacitor to counteract the effects of stray capacitance and the capacitance of connecting cables. The type of decade switch has been chosen with extreme care so as to maintain accuracy and consistency of results. Inductive loops have also been kept to the minimum in the main circuits.

The power supply unit feeds well-smoothed d.c. to the cathode follower networks housed in the ratio arm unit and to the detector unit. Low-voltage d.c. is also supplied to the valve filaments in both units. By this means any interference with the detector due to a.c. pickup and hum is eliminated. This arrangement also permits the use of separate a.c. supplies for the detector unit and the high-voltage part of the bridge.

The high-voltage arms of the bridge, comprising the standard capacitor and test object, are arranged in the main laboratory test area remote from the bridge ratio arm and detector units. Robust spark-gap

The nitrogen-filled standard capacitor



protective devices are mounted on both standard capacitor and test object and these incorporate low-melting-point solder inserts which, in the event of a test object or capacitor failing, operate and provide a solid connection to earth. The high-speed protective gear associated with the power transformer clears the fault. The operator and bridge components are further protected by low-voltage gas-filled arrestors which are accommodated in the ratio arm unit of the bridge.

The standard capacitor has a value of 98.5 picofarads and can withstand 200 kV r.m.s.; its power factor is sensibly zero. It consists of two concentric polished-brass cylinders mounted vertically and housed in a "Texolex" cylinder. The inner tube is the h.v. electrode and is supported from a top casting. The outer tube is the l.v. electrode and is connected to the centre pin of a socket mounted on the base of the capacitor. Guard rings are used for stress control and are arranged at the termination of the l.v. electrode. Metallic screens are used to minimize the effects of stray capacitance and these, together with the guard rings, are connected to the metal base of the capacitor. The dielectric is dry nitrogen at a pressure of 200 lb/sq in and the complete unit is mounted on insulated tripod legs and is self-supporting. Its overall height is 8ft.

The bridge permits capacitances between 20 and 20,000 picofarads to be measured with an accuracy of ±1 per cent or ±1 picofarad, whichever is the larger. This range is covered in five steps in a geometric progression by means of shunt selection. Power factors between 0.0001 and 0.5 can be determined with an accuracy of ±10 per cent or ±0.00005, whichever is the larger.

Fluorescent Street Lighting

Views of Potential Users

By J. R. WEAR*

DURING June and July of this year, a total of 1,000 letters and questionnaire forms on fluorescent street lighting were sent to city, borough and urban district engineers and surveyors and large electrical contractors for the purpose of finding the most desirable features to incorporate in new fluorescent lanterns which my company is producing for street lighting. Replies were received from 61 per cent of those approached and many were accompanied by covering letters containing much additional information on the subject.

Since the application of fluorescent tubes for street lighting is of relatively recent introduction, many engineers have not had practical experience with it and quite a number of them wrote saying that they did not feel justified in completing the questionnaire for this reason. The object of the survey was to obtain a general idea of the trend of opinion on the various matters connected with fluorescent street lighting by local authorities, and for this reason the questionnaire was worded in very broad and general terms.

We consider that in practice the type of column, power of lantern, etc., required, will depend to a greater or less extent on the location, and we feel that we must not adhere too rigidly to the majority preference appearing from the answers to the questionnaire.

The replies have been analysed as follows. The figures given, except for those in Question 3, are the percentages of the total number of questionnaires completed:—

Question 1.—The use of fluorescent tubes for street lighting in various situations was favoured as follows: Civic centres 88 per cent; main shopping streets 91 per cent; other Group A main traffic roads 23 per cent; residential roads 4 per cent; and other Group B roads 5 per cent.

Question 2.—Lighting of Group A roads (25ft mounting height).—

Material preferred for columns and brackets: Concrete 51 per cent; tubular steel 32 per cent; both or no preference 17 per cent.

Control gear housing: 19 per cent desired control gear housed in the lantern and 69 per cent in the base of the column.

The number of 80 W tubes favoured for lanterns was: Two 5 per cent, three 52 per cent, four 19 per cent, more than four

* Director, Scemco, Ltd.

3 per cent. The remainder had no definite choice.

Top suspension was favoured by 35 per cent, and end suspension by 44 per cent. No preference was shown by 21 per cent.

Two-circuit lighting was favoured by 59 per cent.

Question 3.—Lighting of Group B roads (13 to 15ft mounting height).—

Of those who favoured fluorescent tube lanterns for these roads 72 per cent preferred concrete columns, 19 per cent tubular steel and the remainder had no preference.

The power of lantern favoured was two by 20 W, 21 per cent; two by 40 W, 55 per cent; four by 40 W, 17 per cent. The remainder had no preference.

The use of vertically mounted fluorescent tubes in lanterns for residential roads or for special purposes such as seaside promenades found favour with 41 per cent.

Observations and Conclusions by Engineers

A large percentage of the engineers who returned the questionnaire added various remarks which show a considerable insight into the problems involved in the use of fluorescent street lighting.

The analysis of the answers given above shows that civic centres and main shopping streets are the situations most favoured for fluorescent street lighting; here the colour of light is of prime importance and extra capital and maintenance cost is permissible. The use of fluorescent lighting on other Group A main roads finds some support, but only provided that initial cost can be brought down to a figure comparable with that of other forms of illumination.

Some preference for concrete columns was shown where wide footways exist and for tubular steel in congested localities, but this and the method of suspension is largely a matter of personal taste.

The control gear for fluorescent tubes can, in fact, only be entirely located in the base of the column if it has been specially designed and experiments in this direction are being carried out by my company. At present chokes and components are normally housed in the lantern.

The number of 80 W tubes favoured per lantern was probably decided in most cases from consideration of the types of lantern at present on the market, although it is possible that further experience may show that better results can be obtained by other arrangements.

The question of reduced lighting after midnight brings up the economies of saving in power and lamps against the increased cost of lamp changing and the extra cost of control apparatus; it is to some extent dependent on local conditions, but a number of engineers were of the opinion that no saving was actually effected by the use of two-circuit lighting.

With Class B roads the principal objections to the use of fluorescent tube lanterns were the high costs when compared with existing installations and the wilful damage these lanterns are subject to in certain areas. The size and length of the lantern were also unpopular with some.

Nearly every reply gave the question of capital cost as of first importance in considering the use of fluorescent tubes for street lighting. If this can be brought down and reliability maintained, it seems to be the majority verdict that then the popularity of this form of illumination is assured.

Electrical Industry in Canada

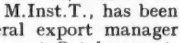
NEW plant and equipment valued at $55 million were added to the Canadian electrical apparatus and supplies industry during the past four years. It is estimated that $13 million more will be spent in this way in 1950. This information is contained in the current issue of the Canadian Bank of Commerce Monthly Commercial Letter. The electrical industry is now the second largest manufacturing industry in Canada. It is employing 2½ times as many workers as in 1939 and the net value of the goods it produces is five times as great. This growth reflects war-time industrialization, greater use of electricity by industry, farm and household and deferred post-war consumer demand. Export of electrical apparatus to war-ravaged countries is also a factor in recent years. The greatest proportion of demand for electrical products arises from industrial expansion and extension and improvement of generating and transmission facilities. It is estimated that within the next two years 1.5 million h.p. will become available from projects now being built, while still further developments are being negotiated. The export market for Canadian electrical goods has been affected by currency difficulties and the volume of trade has fallen off.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE English Electric Co., Ltd., announces that in view of its increasing business in overseas territories, **Mr. L. H. Short,** M.C., M.I.E.E., M.Inst.T., has been appointed deputy general export manager of the company as from 1st October next. For some time Mr. Short has been responsible for certain specific fields of the company's overseas activities, and has also been chief of administration of the company's Traction Department. To enable him to give his whole time to the company's continually expanding export markets, he is now relinquishing the administration of the Traction Department, which will be taken over by Mr. C. M. Cock, chief electrical engineer, Railway Executive. Mr. Short has held a number of important appointments in the company at home and overseas since he joined the company after the 1914-18 war as a pupil and he is a director of the English Electric Export & Trading Co., Ltd.

Mr. L. H. Short

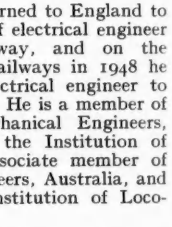


Mr. C. M. Cock

Mr. C. M. Cock is taking up the appointment of general manager of the Traction Department as from 1st October. He has also been elected to the board of the English Electric Export & Trading Co., Ltd. Mr. Cock has had a distinguished career in the railway and engineering world both abroad and in this country. He was born in Melbourne, Australia, and was educated and received his technical training and early experience in Australia at the Melbourne Technical School and with the Victorian Railways. During the 1914-18 war he served in the Royal Navy and saw active service at sea in the Pacific and in the North Sea. In 1919 he joined the construction staff of Merz & McLellan, in Melbourne, in connection with the electrification of the Melbourne suburban railways, and a large power project for the Victorian Electricity Commission. He later went to India as one of the supervising engineers working on important railway electrification work. In 1929 he joined the G.I.P. Railway Transportation (Operating) Department and held appointments as distribution engineer and rolling stock engineer before becoming traction superintendent and later divisional superintendent for the area, including Bombay. Between June, 1941, and February, 1942, Mr. Cock was "lent" to the Royal Indian Navy and served afloat as lieutenant commander. He was recalled in 1942 to his post as divisional superintendent, G.I.P. Railway.

In 1945 Mr. Cock returned to England to take up the post of chief electrical engineer to the Southern Railway, and on the nationalization of the railways in 1948 he was appointed chief electrical engineer to the Railway Executive. He is a member of the Institution of Mechanical Engineers, member of Council of the Institution of Electrical Engineers, associate member of the Institution of Engineers, Australia, and vice-president of the Institution of Locomotive Engineers.

Mr. S. A. Hunter, A.C.T.C. (Birmingham), A.M.I.E.E., has recently been appointed manager of the Birmingham office of Lancashire Dynamo & Crypto, Ltd. The sales of Foster Transformers and Switchgear, Ltd., Nevelin Electric Co., Ltd., Crypton Equipment, Ltd. (industrial products) and Malcolm & Allan, Ltd., all subsidiaries of L.D.C., will also be handled by the Birmingham office. Mr. Hunter served his apprenticeship with the General Electric Co., Ltd., and later was appointed lecturer in the Electrical Engineering Department of the Birmingham Central Technical College. After a period with the Electric Construction Co., he joined Foster Transformers and Switchgear, Ltd., at the Birmingham office. In 1945-6 Mr. Hunter



Mr. S. A. Hunter

was chairman of the South Midland Students' Section of the I.E.E. and was awarded the Centre Premium for a paper. Subsequently he was appointed a visiting lecturer and this year was appointed a Governor of the College. Mr. Hunter succeeds **Mr. R. Greenwood,** M.I.E.E., who has been Birmingham office manager for Lancashire Dynamo & Crypto, Ltd., since 1926 and who is now acting in an advisory and consultative capacity.

Mr. J. Houston Angus, recently special consultant on power development at United Nations Headquarters, Lake Success, has been appointed chairman of the Nigerian Electricity Corporation. This Corporation is being set up under an Ordinance passed by the Nigerian Legislative Council in April last to take over the electricity undertakings hitherto run by a department of the Government and to establish new undertakings where necessary. Mr. Angus, who is forty-three, was educated at Wallasey Grammar School and Liverpool Technical College. He commenced his career as a premium pupil under Mr. B. J. Hawkins, chief engineer of the Wallasey Electricity Department. Later he was at Portishead and in 1932 went to Barking with the County of London Electric Supply Co., as control engineer, subsequently transferring to secondary transmission lines south of the Thames. In 1937 he was appointed senior technical assistant in the Port Elizabeth, South Africa, electricity undertaking, and in 1940 he became city electrical engineer at Port Elizabeth. In 1945 Mr. Angus was appointed, first, deputy Director-General, fuel and power and public utilities branch, and later director of the public utilities branch with the Control Commission in Germany. He then worked as director of the power division for the United Nations Economic Commission for Europe before taking up his recent post.

The Minister of Fuel and Power has appointed the **Rt. Hon. A. Creech Jones,** former Secretary of State for the Colonies, to be a part-time member of the Southern Electricity Board.

Mr. D. J. Storey has left Simms Motor Units, Ltd., to take up a position as electrical engineer to A. E. Jones & Co., Ltd., Buenos Aires, who are agents to Simms Motor Units. Mr. Storey sailed with his family in the *Highland Brigade* on 5th August.

Mr. T. G. Martin, T.D., M.I.E.E., A.I.Mech.E., has resigned from the management of Gresham Transformers, Ltd., in order to take up a Foreign Office appointment as Assistant Director of Public Works to the Government of Cyrenaica. His new duties will embrace responsibility for electricity and water supplies in the territory.

The British Electricity Authority has appointed **Mr. E. L. Gethin,** B.Sc., A. M. I. E. E., as deputy chief contracts officer. Before vesting day, Mr. Gethin was purchasing agent for Edmundsons Electricity Corporation, Ltd. After a short period as purchasing officer for the Southern Area Board, he joined the chief engineer's department at the Authority's headquarters as co-ordination engineer (specifications and contracts) and in that capacity was concerned with the Authority's programme of power-station construction throughout the country.

Mr. E. L. Gethin

After being without a sports ground for three seasons, the Social and Sports Club of the **Plessey Co., Ltd.,** held its first athletic meeting at the new ground, Woodford Avenue, Ilford, on 19th August. The Mayor and Mayoress of Ilford were present, and prizes were presented by Mr. J. Clark, son of the chairman. Over a thousand spectators attended and there were nearly 250 competitors in a programme which, in addition to events confined to Plessey employees, included open and invitation races and several Essex County championships for both men and women.

The Essex Sub-Area Sports and Social Club (Estric) of the **Eastern Electricity Board** held its second annual inter-district athletic championship meeting at the Rainham Sports Ground on 19th August. There was a very good attendance which included the chairman of the Eastern Electricity Board (Mr. C. T. Melling), the secretary (Mr. A. Bond), and the manager of the Essex Sub-Area (Mr. R. H. M. Barkham). Southend District won the "Barkham" cup, the senior officers' trophy and the district managers' cup for the second year in succession. The prizes were presented by Mrs. Melling and Mrs. Barkham. An arts and crafts exhibition was held which attracted nearly 300 entries.

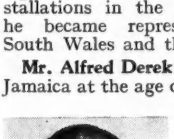
At the works of the **London Electric Wire Co. and Smiths, Ltd.,** on 26th July, the chairman and managing director, Mr. W. J. Terry, supported by Miss M. J. Waters (secretary) and Mr. S. B. Klein (general manager, Leyton), made a presentation of badges and National Savings Certificates to 157 members of the staff and works in recognition of their long

service with the company, ranging from 25 to 52 years. At the conclusion of the ceremony all present were entertained to tea in the works canteen.

OBITUARY

Mr. F. C. Williams.—The death occurred on 19th August of Mr. F. C. Williams, manager of the Cardiff Branch office of G. & J. Weir, Ltd. Mr. Williams, who was in his sixty-fourth year, commenced his apprenticeship at Cathcart in 1902 and had much experience of marine fitting and repair work on the Clyde, and of land installations in the Manchester area before he became representative of Weirs in South Wales and the West of England.

Mr. Alfred Derek Church, whose death in Jamaica at the age of forty-nine we reported in our last issue, was assistant manager of the Public Service Co., Ltd., Kingston, Jamaica, a position which he took up early last year. Before going to Jamaica Mr. Church was the chief engineer of the Fens Sub-Area of the Eastern Electricity Board. In 1926 he joined the Bedfordshire, Cambridgeshire and Huntingdonshire Electricity Co., at St. Neots, with whom he held a number of executive positions before becoming chief engineer. He was appointed to the Fens Sub-Area on vesting date. While he was with the B.C. & H. Co., he was largely responsible for the laying and erection of approximately 1,000 miles of underground and overhead lines, and the connection of 29,000 consumers in a sparsely populated area.



The late Mr. A. D. Church

Mr. M. H. Galsworthy.—The death has occurred of Mr. Montague Herbert Galsworthy, senior director of Galsworthy, Ltd., electric light fittings manufacturers, of Varndell Street, Hampstead, N.W.1.

WILLS

Mr. N. Gunn, director and secretary of Mullard Electronic Products, Ltd., who died on 7th July last, intestate, left £4,416 gross (£3,595 net).

Mr. W. F. R. Campling, works director of Thomas De La Rue & Co., Ltd., and director of Thomas De La Rue Insulation, Ltd., formerly for many years with the County of London Electric Supply Co., who died on 1st April last, left £16,177 gross (£15,138 net).

Electroplating Activities

THE opening meeting of the twenty-sixth session of the Electrodepositors' Technical Society is to take place at Birmingham on 5th September at its Midlands Centre, whose new chairman, Mr. C. Harris, is to deliver an address on "Education in the Electroplating Industry," which is to be followed by a joint discussion between the E.T.S. and the Metal Finishing Association. The object is to support the new Fellowship in electrometallurgy at Birmingham University and to enable the Society and Association to frame a constructive resolution on education in the trade both from the technical school and apprenticeship standpoints.

To-day (Friday) the E.T.S. is holding a special meeting at the Industrial Finishes Exhibition at Earls Court, to be addressed by Mr. A. W. Wallbank, president.

A joint meeting of the E.T.S. with the Studiekring Galvanotechnick, recently formed by the Bond voor Materialenkennis Kring Metalen, is to be held at The Hague (Scheveningen), from 27th to 30th September, at which papers will be presented by Dutch and British authors, and a visit paid to the Philips Eindhoven works.

Heat Transfer Conference

THE advance of knowledge in the mechanism of transference of heat and in the design of apparatus making use of such knowledge will be the subject for discussion at a conference which is to be held in London from 11th to 13th September, 1951. The Institution of Mechanical Engineers, with the co-operation of other kindred societies in this country, and of societies in the British Commonwealth and Europe, is arranging for the presentation of groups of papers on the many aspects of the subject. The American Society of Mechanical Engineers, in conjunction with other societies in the Western Hemisphere, is also working jointly with the Institution in arranging for the preparation of papers by American authors for presentation in London.

It is proposed to restrict the papers to developments during the last ten years, and the main headings which have been agreed as covering the field of the discussion include heat transfer with change of state; heat transfer between fluids and surfaces; conduction in solids and fluids; radiation instrumentation, measurement techniques and analogies; special problems such as heat transfer in turbine blade cooling, in liquid metals, in gas turbines and piston engines, the mercury boiler, etc.

Fan Drives

Torque Characteristics of Induction Motors

By "SASH BAR"

IT is the purpose of this article to set out some of the torque characteristics of fan motors and to show the importance of giving to the motor manufacturer complete data regarding the fan performance, particularly in situations where the starting current is limited and star-delta starting is necessary.

Fan loads differ from friction loads such as line shafting and machine tools in that they have a high inertia, a speed/torque curve which increases as the square of the speed and a low static torque, as opposed to a low inertia and a comparatively high static torque, while the main load torque is not applied until the motor is up to speed. The starting torque of an ordinary squirrel cage motor started in star is sufficient to overcome the static friction of the fan so that the important point is to ensure sufficient accelerating torque to bring the fan up to speed. The accelerating torque at any speed is defined as the difference between the torque developed by the motor and the torque required to drive the fan.

If the pull-out torque of the motor is only about 2.5 times the full load torque, then in star it will be about 0.8 times full load torque and, as shown in Fig. 1, the torque curves of the motor and fan intersect near where the motor torque is maximum. At this point the accelerating torque is zero and the motor speed will not increase further until switched to delta. The current drawn from the line on change-over will be approximately $\frac{1}{\sqrt{2}}$ times the short circuit current, while the instantaneous transient current may even exceed the short circuit current, so that the advantage of star-delta starting, viz.: low starting current, is lost. Furthermore, the accelerating torque above half speed is low and if the inertia of the fan is high, the accelerating time will be unduly long, which, apart from being inconvenient from an operating standpoint, may produce injurious heating of the windings. If, however, the pull-out torque is three or more times full load torque, that is at least equal to full load torque when connected in star, the switch-over to delta need not occur until the motor is working well down on the descending part of its speed/torque curve.

As the pull-out torque and short circuit current are closely related, a motor having a starting current of less than 1.8 times full load current in star is not generally suitable for driving a fan. One method of overcoming this difficulty is to reduce the load of the fan during starting by closing the fan inlet, but this is only possible when it is fitted with dampers which are interlocked to prevent the motor being started unless they are closed.

A common practice of motor manufacturers is to use a stepped bar or deep bar rotor as standard on two- and four-pole motors of about 30 h.p. or over in order to keep the starting current to a reasonable level. This has the effect, undesirable in fan motors, of reducing the maximum torque in relation to starting

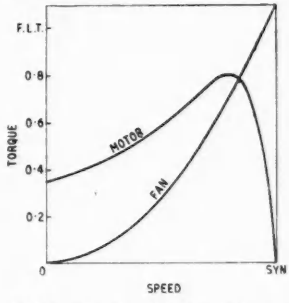


Fig.1. Accelerating time 23 sec.

current. Reference to Fig. 2, which is drawn for normal and stepped bar motors having the same starting current and the same full load slip, will make this more clear. The accelerating time calculated for the two cases shows that the effect of the higher pull-out torque of the normal machine more than offsets its lower starting torque, being 18 sec against 29 sec for the stepped bar machine.

In Figs. 1 and 2 the effects of harmonics and stray load losses on the speed/torque curve have been ignored. Asynchronous torques due to harmonics other than the seventh on three-phase machines and the fifth on two-phase machines occur at a speed where the braking torque of the fan is low, so that any reduction of the accelerating torque will have little effect on the starting time. It is possible, however, for the seventh (or fifth) harmonic torque to be of sufficient amplitude for the accelerating torque to be considerably reduced over a short range of speed and in consequence, the time taken to accelerate through this speed range will be extended. In the example shown in Fig. 3, this has only amounted to about 1.5 sec over the corresponding time in Fig. 1, but if the amplitude of the harmonic torque had been 50 per cent greater, the increase in time over that for Fig. 1 would have been appreciable.

Stray load losses reduce the efficiency of a squirrel cage induction motor by from 0.5 per cent to 4 per cent at full load. These losses are caused by an increase in hysteresis and eddy current losses in the rotor, chiefly due to tooth frequency flux pulsations set up by the load currents. Various investigators have shown that stray losses vary approximately as $(I \times \text{r.p.m.})^2$ and that they exert a braking torque between zero and synchronous speed proportional to $\frac{\text{stray loss}}{\text{r.p.m.}}$ (see Fig. 4).

Although a motor may be specially designed for fan duty, the accelerating time may be too long even when started direct-on-line, due to the high inertia of the fan and the difficulty of ensuring that the dampers are always closed for starting. In such cases, alternative methods of starting become necessary; either the motor may be run up light and the fan started through a clutch or hydraulic coupling, or a slip ring motor may be employed. In both cases, as much as twice load torque can be maintained throughout the starting period.

When the accelerating time is expected to be long, the temperature rise of the winding should be calculated. For this purpose it is convenient to assume that no heat is transferred from the windings to other parts of the motor and that the effective heating current is 0.87 of the short circuit current. The temperature rise in deg C is then given by the formula:—

$$\frac{14.3(0.87\ I)^2\ Rtm}{453WSH} = 0.26\ \frac{I^2Rtm}{W}$$

where I is short circuit current per phase; R, the stator resistance per phase; t, the accelerating time in minutes; m, the number of phases; W, the weight of copper in stator windings and SH, the specific heat of copper = 0.092.

Both the assumptions made in this formula tend to give a higher temperature rise than will actually be experienced, but this safety factor is useful should the accelerating time exceed the calculated time. The temperature rise during starting should be such as to permit two or three starts in succession or to allow for the motor being started when it is already hot from a long continuous run.

The accelerating times given have been worked out for star-

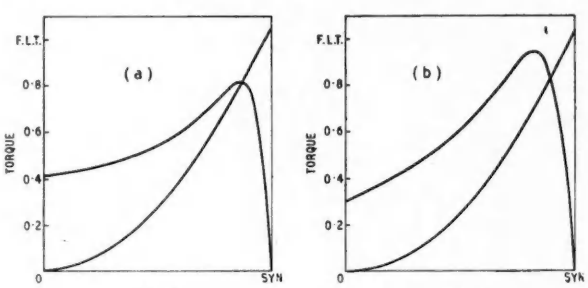


Fig. 2.—(a) Stepped bar rotor; accelerating time 29 sec. (b) Normal rotor; accelerating time 18 sec

delta started motors of similar horsepower, synchronous speed and the moment of inertia of the fan plus rotor, so that the accelerating times are comparable. It will be noticed that the stepped bar motor (Fig. 2a) requires 29 sec to accelerate against 23 sec for the motor in Fig. 1, although it has a higher starting torque and equal pull-out torque. This is due to the pull-out torque occurring at a lower slip in the case of Fig. 2a. In Figs. 3 and 4 the effects of harmonics and stray losses have been superimposed on the speed/torque of Fig. 1 and the times given may therefore be compared with that of Fig. 1.

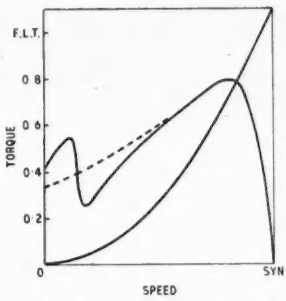


Fig. 3.—Accelerating time 24.5 sec

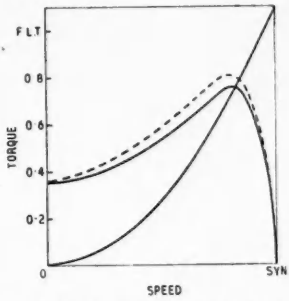
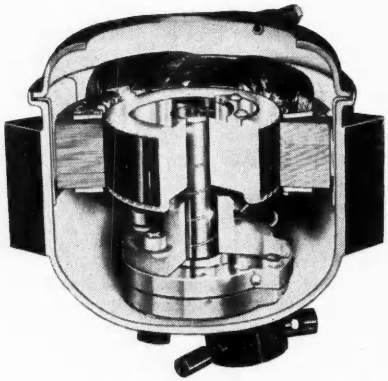


Fig. 4.—Accelerating time 28 sec

SWISS ELECTRICAL IMPORTS

A FEATURE of the electrical import trade of Switzerland last year was the increase, though still on a small scale, of German participation. In imports of dynamo-electric machinery, meters and measuring instruments (of which Switzerland is a far larger exporter than importer) as well as of the lighter unspecified apparatus, there were declines which, however, were offset by increases in telephone, telegraph and radio apparatus and lighting and starting equipment. The values of the chief items in 1949 with notes of increases or decreases on 1948 are shown in the table:—

Class of Goods and Countries of Origin	1949 Sw. fcs. (000)	Inc. or dec. on 1948 Sw. fcs. (000)
Accumulators	3,107	+ 1,419
From United States	769	+ 286
„ *France*	391	− 189
„ *Sweden*	187	− 205
„ *Britain*	305	+ 150
Insulators	2,217	+ 1,073
From France	416	+ 169
„ *Denmark*	1,265	+ 615
„ *United States*	243	+ 48
Meters and measuring instruments	3,454	− 130
From United States	1,808	+ 270
„ *Germany*	417	+ 106
„ *Britain*	564	+ 110
„ *Holland*	232	− 47
Telephone and telegraph app.	12,186	+ 2,206
From Belgium	9,426	+ 2,666
„ *Britain*	312	− 360
„ *Germany*	232	+ 96
„ *United States*	682	+ 272
Radio apparatus	15,804	+ 214
From Britain	2,179	− 101
„ *Holland*	2,763	− 42
„ *France*	724	+ 151
„ *United States*	8,352	+ 553
„ *Sweden*	430	− 158
„ *Hungary*	249	− 241
Insulated wire and cable	1,825	− 35
From Germany	144	+ 120
„ *Belgium*	281	− 212
„ *Britain*	327	+ 127
„ *United States*	115	− 295
Unspecified electrical apparatus over 500 kg.	327	+ 232
Ditto, 50 to 500 kg.	696	− 694
From Germany	111	+ 7
„ *Holland*	45	− 86
„ *Britain*	47	− 13
„ *United States*	233	− 74
„ *Italy*	166	+ 85
Ditto 3 to 50 kg.	715	− 11
From United States	252	− 26
„ *Germany*	79	+ 13
„ *Britain*	119	+ 36
Ditto under 3 kg.	1,940	− 588
Dynamo-electric machines	7,351	− 3,193
From Italy	992	− 86
„ *France*	460	+ 105
„ *United States*	3,108	− 1,594
„ *Germany*	516	+ 13
„ *Britain*	1,432	− 484
Lighting and starting equipment for vehicles	4,366	+ 1,037
From France	568	+ 104
„ *United States*	1,973	+ 681
„ *Germany*	940	+ 348
„ *Britain*	444	+ 47
Elec. incandescent lamps	4,821	− 1,325
From Hungary	503	− 188
„ *United States*	856	− 100



Cut-away model of the "F.12" sealed rotary unit. The simplicity of design is apparent from the complete set of components seen below

Refrigeration Compressors

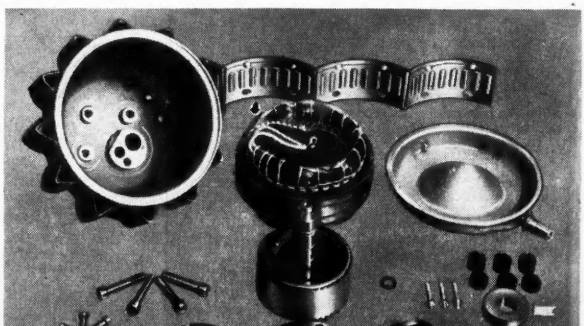
Manufacture of Frigidaire Sealed Rotary Units at Hendon

LARGE-SCALE production is now in progress at the Hendon works of the Frigidaire Division of General Motors, Ltd., of the "F.12" rotary refrigerating compressor, or "Meter-Miser," which, although introduced in Frigidaire household refrigerators in 1934, has hitherto been manufactured only in the United States. At present one size only, for use in household refrigerators, is in volume production but plans are already well advanced for increased production of larger sizes for commercial applications and an output of three times the original figure is contemplated.

With only three moving parts, the "F.12" unit can claim to be one of the simplest mechanical refrigerating compressors. It consists basically of an electric motor driving an eccentrically operated rotary compressor, the whole unit being hermetically sealed in a welded steel case.

Apart from the stator and rotor and the steel case, or shell, with its attached charging body and cooling fans, the only major components are the six items forming the pump, namely, the vane, the cylinder, the eccentric shaft, the roller and the upper and lower bearings. The simplicity of the design renders essential accuracy of manufacture of components, as well as close attention to cleanliness and processing which a recent visit to the company's factory made evident.

Before production of the "Meter-Miser" could commence over one hundred new machines had to be installed (some were specially manufactured in England from U.S. designs) with many special tools and processing electric furnaces, dehydrating ovens and electro-cleaning plants. The unusually high standard of accuracy required also made it



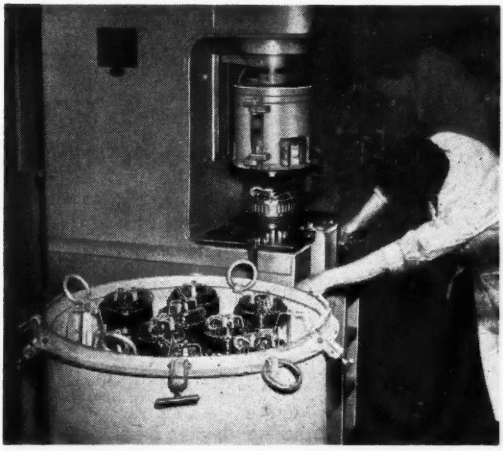
Preparing outer steel shells into which a compressor and motor have to be fitted with great accuracy

necessary to train the operators of the new machines.

The elimination of moisture from the unit is a problem encountered throughout the whole process of manufacture. Although transported in hermetically sealed glass containers, as much as 1½ teaspoonsful of water is removed from the stators arriving at the factory from the associated A.C. Sphinx Division of General Motors, Ltd. This is done by immersing the stators in "kettles" of white spirit which is raised to high temperature, causing the water to sink to the bottom whence it is removed. The spirit is then drawn off, nitrogen being introduced to break the vacuum. A sample from each batch of 44 contained in a kettle is tested for moisture content and the same test is applied to the rotors.

After pressing, machining and welding on the cooling fins, the lower shells, previously washed in white spirit, have all the joints round the charging body studs, wiring holes and welded points brazed to ensure gas-tight joints. Distortion resulting from the brazing is rectified on an expanding machine and after machining, drilling, etc., the shells are tested for leaks in a water bath under a pressure of 230 lb/sq ft. A special machine ensures an accuracy of finish to 6 micro-inches on the four metal studs or pads on which the cylinder rests.

Pressing the stator assembly into position inside the shell



The assembled unit undergoing a test run before the steel cover is welded on

A thorough cleaning in a series of degreasing tanks prepares the shells for inspection in an air-conditioned glass house where all the other components eventually arrive for inspection and final assembly. An even higher standard of accuracy is demanded in the manufacture of the components of the pump which involves various machining operations, heat treatment and demagnetization.

With the motor and pump assembled in the lower shell, the unit is given a test run, the electrical and mechanical operation being carefully checked before the pressed steel cover is welded on to the completed unit. After half-an-hour's immersion in water with dry air under a pressure of 230 lb/sq in pumped in, the units have their mounting brackets welded on and then go in batches of 64 to an oven. Here again with a pressure of 230 lb/sq in inside, they spend four hours at a temperature of 280 deg F, any moisture being removed. With the aid of vacuum pumps, a holding charge of nitrogen is introduced.

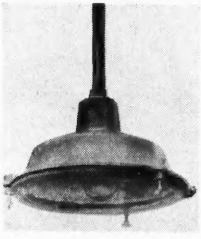
The dehydration process is repeated twice after the addition of the condenser and evaporator units and the refrigerant (Freon-12) is then charged in at an automatic control board on the end of the assembly line. During final test, examination of the completely assembled unit in a darkened room under ultra-violet light will disclose any small trace of oil externally by its fluorescence, thus revealing any leakage of oil or refrigerant.

While the unit is still on the electrical section of the overhead conveyor an accurate check is made of its operating wattage and refrigerating efficiency. An audiometer test is also made of the noise level of the mechanical unit, which is completely rejected if it is above the standard fixed for quiet running.

Locomotive Shed Lighting

IN the running shed at Willesden Motive Power Depot, London Midland Region, British Railways, 125 new lighting fittings have been installed. The design is the result of collaboration between the Civil Engineer's Department, L.M.R., and the General Electric Co., Ltd., the principal objects being to guard against corrosion and the entry of moisture. The fittings are suspended at a height of 15ft in rows between the shed roads with 15ft spacing between fittings and between rows. Two switches, controlling alternate lamps, are provided for each row of fittings, so that either half or full lighting may be used as required.

The fitting has a die-cast aluminium body, "pyluminized" and painted with two coats of enamel. It is the practice of the London Midland Region to apply a top coat of bitumastic paint on installation. The interior of the fitting is stove-enamelled white, and the lamp itself is protected from the outside atmosphere by a clear glass visor cemented to a hinged ring secured to the body by captive winged screws. An oil-resistant soft rubber gasket ensures a tight joint. A skirt formed on the lower circumference of the body ensures that any water collecting on the outside of the fitting drips clear. The fitting is arranged to take a 150 W or 200 W tungsten filament lamp, and for this purpose the lampholder is adjustable. An anti-condensation shield is provided immediately above the lampholder. The total weight of the fitting, excluding the lamp, is 15¾ lb.



New G.E.C. fitting for locomotive shed

Commerce and Industry

Forward-Buying Charges

Large Contract for Pakistan

TO discourage excessive forward buying of copper, lead and zinc, of which there are said to be ample stocks for current needs, the Minister of Supply has substantially increased forward buying charges for these metals. The charge per ton for two- or three-month forward buying of copper is raised from 30s to £13 10s, and for four- to six-months' forward buying from £3 to £15. For lead the charges are raised from £1 to £7, and from £2 to £8 respectively, and for zinc from £1 to £13 and from £2 to £14.

Commercial Instrument Conference

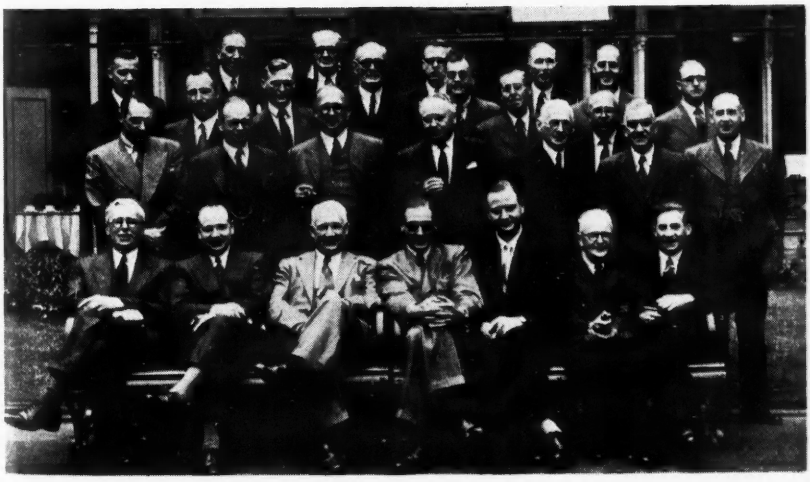
The Commercial Instrument Section of B.E.A.M.A. recently held a conference at Brighton, which was attended by many men well known in the electrical industry. The members who were present appear in the accompanying picture.

Pakistan Electrical Contract

A half-a-million pound contract has been secured from Pakistan by Aberdare Cables, Ltd. The contract covers the supply and installation of all electrical equipment for a large manufacturing undertaking in Pakistan, including several miles of overhead line to the site. Electrical power is to be supplied to a wide area; not only workshops but a new housing estate is included in the project. The overhead main supply at 11 kV will be brought into main substations and taken by means of underground cables to a number of sub-

At the B.E.A.M.A. Commercial Instrument Section Conference, Brighton

Back row (left to right): Messrs. H. L. Shaughnessy (G.E.C.), A. R. Ridding (Ferranti), F. E. Pomeroy (Nalder Bros. & Thompson), J. D. Carter (Ferranti), A. R. Miller (Nalder Bros. & Thompson), D. Douet (Johnson & Phillips), W. Bamford (Everett, Edgcumbe), N. Devonald (B.T.H.), W. C. C. Turner (Crompton Parkinson), W. A. Shaw (Evershed & Vignoles), H. S. Laverack (secretary) and E. Speller (Edison Swan). Second row (left to right): Messrs. A. E. Bates (English Electric), F. C. Hoyle (Record Electrical), R. A. Erskine (Erskine Heap), L. R. Richards (Crompton Parkinson), A. E. Jepson (hon. member), E. P. Martin (assistant secretary), T. Howard (English Electric) and W. Ashworth (Record Electrical). Sitting (left to right): Messrs. R. H. Knott (Metropolitan-Vickers), D. M. Buist (B.E.A.M.A. export director), A. G. O'Neill (chairman) (Nalder Bros. & Thompson), D. D. Walker (vice-chairman) (Evershed & Vignoles), A. R. Pike (Record Electrical), H. V. Owen (hon. member) and A. G. Lang (Elliott Bros. (London)).



stations in which e.h.v. switchgear, transformers and l.v. switchgear will be installed and from which the l.v. distribution cables will be run. Standardization has been adopted as widely as possible throughout the whole installation. The overhead line, e.h.v. and l.v. cables are being manufactured in South Wales. South Wales Switchgear, Ltd., are supplying all switchgear and transformers from the Blackwood and Treforest factories respectively. In each of the larger substations, of which there are a considerable number, there will be installed high-voltage switchgear; this will consist of a switchboard having six to ten panels with vertical isolation type oil circuit-breakers of either 250 or 150 MVA breaking capacity, two or more transformers each of 750 kVA, and heavy duty type l.v. circuit-breakers for 440 V. The complete installation on site will be carried out by the Aberfren Cable & Construction Co., Ltd., an associated company of Aberdare.

Heavy Cooking Equipment at Manchester

Manchester Corporation Education Committee reports that the British Electrical Development Association has made a gift to the College of Domestic Economy of a number of heavy-duty cooking appliances forming the greater part of the equipment necessary to establish a kitchen for large-scale cooking. The Association has also presented a number of other useful electrical appliances to the college. These gifts have been accepted and, together with extra equipment costing £796, will enable the Committee to provide adequate facilities for large-scale cooking.

Sales Management Examinations

The Education Committee of the Incorporated Sales Managers' Association announces that qualifying and final examinations in "Sales Management" will be held on 7th, 8th and 9th December next. Centres will be opened in London, Glasgow and Manchester only. Entry forms are available from the secretary, I.S.M.A., 23, Bedford Square, London, W.C.1, and must be returned by 30th October.

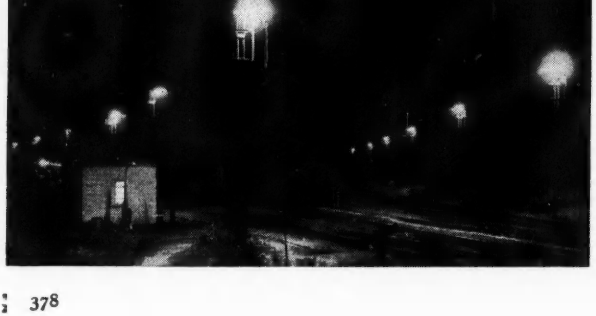
Telecommunication Equipment for Greece

As part of the complete reconstruction of the Greek telecommunication system, the Greek Post and Telegraph authorities have ordered from Standard Telephones & Cables, Ltd., their main overseas radio-telephone link system. This will provide telephone circuits of the most modern standards with the United Kingdom and the United States. The equipment to be supplied covers the complete system and includes two 4 kW single-sideband transmitters for simultaneous working to London and New York, with a 40 kW power amplifier for use when transmission conditions are poor, two single-sideband receivers, equipment for connecting four speech circuits to the telephone network including a privacy system and aerials, power plant, etc. The value of the installations, work on which will commence early next year, is approximately £80,000.

Railway Siding Lighting

A good example of marshalling yard lighting is provided at Willesden Junction Siding, London, N.W., where a new scheme of Simplex "Reflecto Flood" lighting has just been installed. The "nerve centre" of this 24-sidings yard with nearly 100 miles of track is the "hump" area where the trucks are switched to the required sidings. It is necessary for the point-man to see a chalked number on the front of each wagon so that he may switch it correctly. 500 W lamps are fitted in the "Reflecto Floods" used along the single track of the "hump," and 300 W lamps elsewhere. The 300 W lamps are mounted two per column.

The floodlights are of vitreous-enamelled heavy-gauge steel and they give a wide forward and downward flood of light. The cast-iron weatherproof body with its detachable top provides easy wiring



Simplex floodlighting equipment at Willesden Junction Siding

facilities with complete weatherproofing of the lampholder, and connections. The substantial clamp arrangement permits convenient attachment to existing poles.

"The Telcon Story"

On the occasion of the centenary of the first Dover to Calais submarine telegraph cable and also the celebration of its own centenary, which was deferred from 1945 owing to war conditions, the Telegraph Construction & Maintenance Co., Ltd., has issued a 175-page book entitled "The Telcon Story." This well-written and attractively presented volume contains a very full and interesting account of the company's activities and achievements in the field of submarine cables from its formation during the last century until the present time. The development of submarine cable itself is, of course, treated in detail and the processes involved in its present-day production are described in some detail.

Mention is also made of the company's other interests which include metals, magnetic materials, power and high-frequency cables and plastics. The historic value of the volume is obvious but apart from this it contains a great deal of technical information which will be of interest to engineers. Copies of the book have already been issued to the many guests which the company has been entertaining in London this week.

Educational

The prospectus and syllabuses of part-time (day and evening) courses in applied chemistry are now available from the Northampton Polytechnic, London, E.C.1. A course of lectures on refractories, their manufacture, properties and uses, by Mr. L. R. Barrett, commences on 3rd October. Particulars can be obtained from Mr. J. E. Garside, head of the Department of Applied Chemistry.

The Manchester and District Advisory Council for Further Education has published particulars of post advanced lectures in electrical and mechanical engineering. Inquiries should be addressed to the hon. secretary of the Council, Education Offices, Deansgate, Manchester, 3.

A.S.E.E. Helps E.I.B.A.

When the Association of Supervising Electrical Engineers decided to terminate its unemployment benefit scheme the fund had a reserve of £94. The members of the scheme decided that it should be handed over to the Electrical Industries Benevolent Association. In addition to this the A.S.E.E. makes an annual contribution of 100 guineas, and £116 was collected at meetings during the past year, so that E.I.B.A. funds benefited to the extent of £315 altogether.

"Magnicon" Alternators

Crompton Parkinson, Ltd., have received from the Macfarlane Engineering Co., Ltd., Glasgow, an exclusive licence to manufacture and sell "Magnicon" self-regulating alternators. These fully patented machines have inherent voltage regulation of plus or minus 2½ per cent, or with a special design, plus or minus 1 per cent. Automatic voltage regulators are not necessary. At present these alternators are available in the following sizes: 10 kVA—150 kVA at 1,500 r.p.m., 10 kVA—130 kVA at 1,000 r.p.m., 20 kVA —100 kVA at 750 r.p.m.

New Marconi Magazine

We have received from Marconi's Wireless Telegraph Co., Ltd., a copy of the first issue of "The Marconi Companies and their People," a well-produced staff magazine of varied contents. Sir George Nelson, chairman of the English Electric group, which embraces the Marconi companies, introduces the new publication; there follows a brief illustrated review of the companies' history and achievements; several articles; a short story; a caricature by Fred May; and a generous proportion of numerous personal, sports and social notes.

Copper Price Reduction

The price of electrolytic copper, which was increased by £16 a ton to £202 a ton on 22nd August, was cut on 24th August by £16 a ton, thus reverting to the former level of £186 a ton.

Engineering Wages

At its annual conference last week the Confederation of Shipbuilding & Engineering Unions decided to give notice to end the existing conciliation arrangements and press for the substitution of the system which has already been under discussion. This would involve the establishment of a joint council with various functions apart from the negotiation of wages and conditions. Some of these functions are held by the employers to interfere with the management of the industry.

Instrument Works Fire

Everett Edgcumbe & Co., Ltd., tell us that a portion of their Hendon works was seriously affected by fire on Saturday last. Plans have been made to continue production. The machine shop is undamaged and

will be in full operation. In addition, a certain amount of work is being transferred to the factory at Houghton-le-Spring, Co. Durham, and a new site with buildings adjacent to the works, which has recently been acquired, is being rapidly equipped. It is expected that certain delays will occur but production is to continue in certain departments and will be commenced again quite soon in others.

Television from France

The first programme to be televised direct from France was successfully transmitted by the B.B.C. on Sunday last (27th August) in connection with the celebrations marking the centenary of the first cross-Channel submarine telegraph cable. To achieve this end a portable micro-wave television link, made by Standard Telephones & Cables, Ltd., was used to span the Channel, while similar apparatus supplied by the latter company, together with Marconi's Wireless Telegraph Co., Ltd., and Pye, Ltd., carried the signal in three "hops" to the London University building. From this point it was conveyed by land line to Alexandra Palace for transmission to London and Midland Region viewers. To assist the engineers operating the equipment six 20 W v.h.f. fixed station radio-telephone installations supplied by Mullard Electronic Products, Ltd., were used to link the points of re-transmission of vision signals with each other and with the end points.

Trade Announcements

Mr. P. M. King has been appointed as a representative of **Simpson, Baker & Co., Ltd.,** and will operate on the company's behalf in the city of Birmingham.

J. G. Statter & Co., Ltd., have appointed Wm. Don & Partners, Crown Works, Crown Point Bridge, Leeds, 9, to represent them in the Yorkshire area for the sale of their switchgear.

From to-day (Friday), the address of the London office of **Dorman & Smith, Ltd.,** will be 10, Emerald Street, W.C.1. (telephone: Chancery 6431. Telegrams: Prefix, Holb, London).

The **Hirst Electrical Co.,** and **Hirst Electronic Development, Ltd.,** have removed to Dermody Road, London, S.E.13 (telephone: Lee Green 2041).

J. & H. Walter, Ltd., have removed to Gloucester House, 19, Charing Cross Road, London, W.C.2 (telephone: Trafalgar 6213).

The offices and retail showrooms of **G. E. Wallis & Sons (Electrical), Ltd.,** have been removed to 9, Mill Street, Maidstone (telephone: Maidstone 2015). The electrical contracting stores will remain at Broadmead Works, Maidstone.

Somelec Sales, Ltd., 5, Park Place, Leeds, 1, have, from 1st September, been appointed agents of Linolite, Ltd., in the Yorkshire and East Midland Area.

Catalogues and Lists

Aidas Electric, Ltd., Sadia Works, Rowdell Road, Northolt, Greenford, Middlesex. —Folder on Aidas immersion heating units for industrial and domestic uses.

Simplex Electric Co., Ltd., Broadwell, Oldbury, Birmingham.—Folder on the company's entire range of water heating appliances.

Dexray Engineering Co., Ltd., Brock Street, Lees Street, Manchester, 1.—Priced catalogue of industrial and domestic switch and fuse gear.

Luxram Electric, Ltd., 53, Great Eastern Street, London, E.C.2.—Folder on Christmas decorative lighting sets and spare lamps.

Dawe Instruments, Ltd., 130, Uxbridge Road, Hanwell, London, W.7.—Leaflet on the type 1250 dynamic balancing machine.

Brier Infinitely Variable Gear Co., Ltd., 19, Ebury Street, London, S.W.1.—Technical brochure on the company's infinitely variable gear unit.

Tuscan Engineering Co., Ltd., 447, Grand Buildings, Trafalgar Square, London, W.C.2.—Priced catalogue of electric motors.

Electroway Heaters, Ltd., Sparrow Hill, Loughborough, Leics.—Pocket-sized catalogue of domestic heating appliances.

Vaughan Lift Engineering, Ltd., 47/51, Featherstone Street, London, E.C.1.—Illustrated catalogue of electric lifts, hoists, pulley blocks and cranes.

INFORMATION DEPARTMENT

THE extensive records of our Information Department enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the makers of the following:—

"Traag" fuse holders and fuses.

"Bulton" b.c. lamp holders.

Cylindrical glass shades. Colour: opal-flashed champagne. Size: 9in diameter, height 5in, 8in lip.

General inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by the Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

RECENT INTRODUCTIONS

NOTES ON NEW ELECTRICAL AND ALLIED PRODUCTS

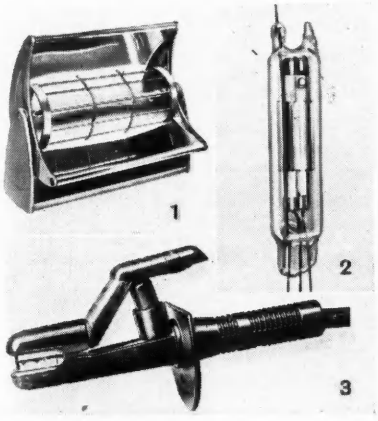
"Xcel" Fires

THREE 1kW fires are announced by ELEXCEL, LTD., Victor Works, Broad Green, Liverpool, 14. The "Xcel Crosby" portable reflector fire, with rod-type element, is finished in golden bronze enamel and is fitted with a chromium-plated reflector and guard. The "Bathroom" model of this unit, finished in white stove enamel, is supplied complete with cord attachment and wall mounting bracket. Each model sells at £3 10s (plus £2 11s 6d purchase tax in this country). Wide heat distribution is povided by the curved fire-bar element of the "Sefton" fire, also finished in golden bronze enamel. Its price is £1 8s (£1 os 7d purchase tax in this country).

Electrometer Valve

A sub-miniature electrometer triode, known as the "Osram ET3," has been developed and is now available from the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2. Because of its small physical size, high stability and low inter-electrode capacitance (1.3 $\mu\mu$F between the control grid and the other electrodes) this valve is in many cases better than the older types. The filament is designed for 1.25 V operation at 0.025 A. The use of these valves for ionization measurements and in connection with piezo- and photo-electricity makes a high grid insulation of primary importance. The ET3 has an insulation resistance of not less than 10^4 MΩ and to maintain this value it is coated with a water repellent substance.

(1) "Xcel Crosby" fire. (2) "Osram" ET3 sub-miniature electrometer triode. (3) Murex heavy-duty welding electrode holder



Plug-in Fluorescent Lighting Fitting

Where low initial cost and quick fixing are of primary importance the "Quicklite" fluorescent lighting fitting made by the Q.F. LIGHTING CO., LTD., 1, Dover Street, London, W.1, has much to recommend it. Instead of the usual heavy and expensive ballast unit, a special resistive control unit is employed and, although the latter requires 20 W more, twice as much light is emitted as from an incandescent bulb of the same wattage.

Instant starting is claimed and a starter switch is not required. Any standard fluorescent lamp can be used. The circuit design ensures maximum lamp life. The unit is adaptable for use on 200/250 V, reliable starting being obtained down to 180 V. A special model for d.c. incorporates an automatic reversing switch—no extra wiring is needed—and a thermal starter.

Constructed of non-corrosive aluminium and finished in stoved enamel, the "Quicklite" weighs only 2 lb and can be plugged into any lampholder. Complete with lamp, ceiling ring suspension, a single 4ft fitting costs £3 10s for a.c. and £4 17s 6d for d.c. A twin 4ft fitting is available for a.c. for £5 5s and a twin 2ft unit for £4 4s. Purchase tax is payable on the lamps only. If required the fittings can be supplied without lamps.

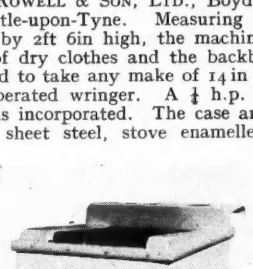
Electrode Holder

An electrode welder (type H55) has recently been designed for heavy-duty electric arc welding by MUREX WELDING PROCESSES, LTD., Hertford Road, Waltham Cross, Herts. It is suitable for currents of from 100 to 500 A and its long-life jaws are grooved to facilitate automatic positioning of all electrodes from No. 8 gauge to ¼in

diameter. All parts of the holder are replaceable with spares and it can be assembled or dismantled by means of an Allen key. All live parts are shrouded in shockproof insulating material, and for a heavy-duty holder the device is extremely light (24 oz). This, combined with good balance, enables the operator to work efficiently and without fatigue.

Washing Machine

A rolling-beating action is provided by a new type of agitator employed in the "Ace Roto-Wash" washing machine developed by J. ROWELL & SON, LTD., Boyd Street, Newcastle-upon-Tyne. Measuring 1ft 8in square by 2ft 6in high, the machine holds 10 lb of dry clothes and the backboard is designed to take any make of 14 in or 16 in hand-operated wringer. A ¼ h.p. B.T.H. motor is incorporated. The case and skirt are of sheet steel, stove enamelled in a

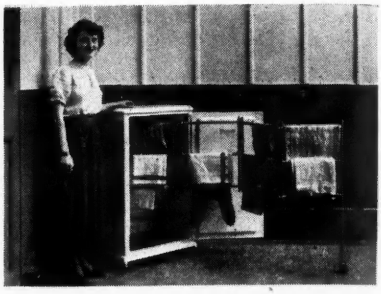


"Ace Roto-Wash" washing machine

variety of different colours, while the top and lid are of aluminium. Swivel castors are fitted. The price is £23, plus purchase tax in this country.

Drying and Airing Cabinet

Owing to a novel method of packing, the "Drydenair" drying and airing cupboard has an exceptionally large capacity for its size (40 in high by 22 in wide by 12 in deep) and there is easy access to any item of clothing without disturbing other clothes. The loading is only 500 W, rapid hot air circulation being achieved by the use of a "Barrs" patent heat exchanger. A pilot light shows when the heat is on. Rubber tyred, ball bearing castors permit easy movement. The cabinet, which is constructed of rustless metal and is finished in cream



"Drydenair" drying and airing cabinet

enamel, is obtainable from THOMAS DRYDEN & SONS, LTD., Grimshaw Street Foundry, Preston, for 15gns (plus 4gns P.T. in this country).

Cable Identification Ferrules

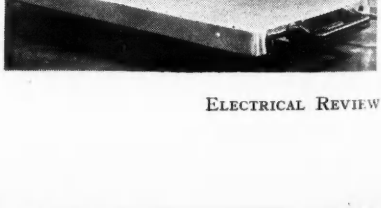
To simplify identification in complicated electrical circuits, CRITCHLEY BROS., LTD., Brimscombe, Glos, have designed a fully interlocking plastic ferrule consisting of several units, each of which is engraved with a single digit or letter. From these an almost unlimited range of code numbers or combinations can be built.

To prevent the digits or letters moving, each ferrule unit is made with a key and keyway, which ensures that they can only be assembled with the engravings in line and cannot come out of alignment at any time. These ferrules can be supplied in black on white engraving or vice versa, or in other colours to suit individual requirements. Entry of cables from both right and left, without one side reading upside-down is provided for by ferrules being engraved for either hand as required.

Hotplate

The "Solectra 261" hotplate (BRATT, COLBRAN, LTD., 10, Mortimer Street, London, W.1) is loaded at 140 W with a heating surface measuring 15¼in by 8⅝in. A control switch is provided. The finish is a silver anodic colour with black bakelite handles. The feet are inset with rubber and the hotplate is fitted with 6½ft of flex. The price is £3 2s 6d.

Bratt Colbran "Solectra 261" hotplate



FINANCIAL SECTION

Company Notes and Stock Exchange Activities

REPORTS AND DIVIDENDS

Aberdare Cables, Ltd.—The annual meeting was held on 25th August, Sir George Usher (chairman) presiding. In his statement circulated with the report and accounts the chairman, referred to the cuts in capital expenditure by the British Electricity Authority and the Area Electricity Boards which had resulted in a fall in the draw-off against contracts for cables; this caused a necessary revision and cutting down of their production. Similar remarks were applicable to the National Coal Board and British Railways. Substantial contracts had been obtained during the year in Russia, Australia, Finland, and Egypt, in spite of keen competition. In addition they had recently obtained a large order in Pakistan. There were signs of some easement in the position in India and import licences were beginning to filter through again. In South America the necessary sterling to purchase cables had not been available and orders, in consequence, had shrunk. In addition competition from cable makers on the Continent and particularly Italy and Japan, was assuming serious proportions all over the world. In their South Wales factories manufacturing facilities for producing a much wider range of cables had been installed. The associated company, South Wales Switchgear, Ltd., was in full production at the recently expanded factory at Blackwood, Mon., and Aberdare Cables of South Africa, Ltd., had had a successful year.

The company has declared an interim dividend of 10 per cent, less tax (against 12½ per cent).

Electrical Components, Ltd., reports combined net profits for the year to 31st March last of £145,290, which with rents, etc., of £1,664, makes £146,954 (against £127,821 for nine months' trading of Electrical Components and twelve months' trading of subsidiaries). After providing for depreciation, etc., there is a net balance of £119,594 (against £108,850). The final dividend is 12½ per cent, making 20 per cent for the year.

In his review of the year, circulated with the report and accounts, Mr. H. S. Seccombe (chairman and managing director) says that a noticeable feature was that selling prices, which had generally been on the increase since 1940, tended to stabilize themselves at 1948 levels, and, in fact, in some cases actually declined.

Richardsons Westgarth & Co., Ltd., report a group trading profit for the year ended 31st March last of £643,421, as compared with £600,225 for 1948-49. Depreciation required £82,108 and taxation £283,150. The net profit of the parent company was £279,438 (against £169,303). General reserve receives £125,000 and superannuation reserve £50,000. It is proposed to pay a dividend for the year of 12 per cent (against 10 per cent), and the balance carried forward is £126,200 (against £91,829 brought in).

Newton Brothers (Derby), Ltd., report a trading profit for the year ended 31st March last of £115,007, as compared with £84,421 for the preceding year. After various provisions there is a net profit of £43,749 (against £28,893), to which is added £14,809 brought in, making £58,558 available. After contributions to reserves, etc., it is proposed to pay a dividend of 10 per cent, and a bonus of 5 per cent on doubled capital (against a dividend of 17½ per cent, and a bonus of 7½ per cent). The balance carried forward is £16,407.

Lancashire Dynamo & Crypto, Ltd., announces that 95 per cent of the shares recently offered as rights to the shareholders were applied for and alloted. Applications for excess shares were so large that it was only possible to allot these to a very small percentage of the applicants. The issue was of 83,476 ordinary shares of £1 each, offered to existing holders of ordinary stock or shares at 80s per share, in the ratio of one new share to every £6 of ordinary stock or six ordinary shares of £1 each.

Cyprus Government Issue.—On Wednesday last the Government of Cyprus offered for subscription £2,000,000 3½ per cent inscribed stock, 1969-71 at par; £540,000 of the stock has already been placed. The proceeds of the loan will be applied to the financing of a scheme for the centralized generation and distribution of electricity in Cyprus.

Vactric, Ltd., report a group trading, subject to audit, of £130,144 for the year ended 31st March last, as compared with a loss for the previous year of £68,768. After deducting depreciation £33,557, pro-

vision for stock obsolescence £16,247, and taxation £9,106, there is a net profit for the year of £71,234 (against a loss of £101,448). This is applied to reducing the loss of £100,411 brought in, leaving a loss to be carried forward of £29,177. No ordinary dividend is recommended.

The Rheostatic Co., Ltd., has declared an interim dividend of 4 per cent on increased capital (against 6 per cent).

The Sturtevant Engineering Co., Ltd. The directors recommend a share bonus issue of one share of 5s fully paid for each five 5s shares held by capitalizing £49,314 from general reserve. The shares will rank for the dividend payable for the year ending 31st December next.

NEW COMPANIES

Ionic Instruments (London), Ltd.—Registered 13th July. Capital £1,000. Designers and manufacturers of and dealers in apparatus, appliances, instruments, etc. Directors: C. J. Sanders and S. R. Wilkins. Regd. office: 62-64, Moorgate, E.C.2.

Edgar Lowe (Ballymena), Ltd.—Registered in Belfast 17th July. Capital £2,000. Electrical engineers and contractors, wireless, mechanical and general engineers, etc. Directors: E. Lowe and Agnes E. Lowe. Regd. office: 26, Linenhall Street, Ballymena.

J. Doherty & Co., Ltd.—Registered in Belfast 17th July. Capital £2,000. Electrical engineers, manufacturers of and dealers in electrical and other goods and materials, etc. Subscribers: J. Doherty and Agatha D. Ross. Regd. office: 86, Duke Street, Londonderry.

Thomas Fairlie & Co., Ltd.—Registered in Edinburgh, 15th August. Capital £2,000. Electricians and electrical engineers, etc. Directors: Jessie Bell, David Wood and Elizabeth C. Connell. Regd. office: 105, Stockwell Street, Glasgow.

Alan E. Dent, Ltd.—Registered 16th August. Capital £15,000. Electrical engineers and contractors, wireless, mechanical and general engineers, etc. Directors: A. E. Dent and Mrs. Ethel Dent. Regd. office: 24, Russell Street, Nelson.

Moraheat Company, Ltd.—Registered 15th August. Capital £1,500. Electricians, manufacturers of and dealers in domestic, household and industrial immersion heaters, mechanical and general engineers, etc. Directors: C. V. Moor, R. H. Moor and J. G. Butcher. Regd. office: 85, Edmund Street, Birmingham, 3.

George Smith Engineers (Dundee), Ltd.—Registered 14th August. Capital £10,000. Electrical, mechanical, telephone, lighting, heating and general engineers, etc. Directors: W. A. Smith, F. G. Bennett, A. C. C. Smith and G. Smith. Regd. office: 11, Meadow Street, Dundee.

Peter Loades, Ltd.—Registered 12th August. Capital £1,000. Wireless, electrical and general engineers, installation contractors, lighting specialists, etc. Directors: H. C. P. Loades and Mrs. Olive R. E. Loades. Regd. office: 25, Tower Street, King's Lynn, Norfolk.

Seal Radio & Television Service, Ltd.—Registered 12th August. Capital £3,000. To acquire the business of radio and electrical engineer carried on by A. A. Seal at 105, Moorland Road, Weston-super-Mare. Regd. office: 105, Moorland Road, Weston-super-Mare.

INCREASE OF CAPITAL

Sunvic Controls, Ltd.—Increased by £66,800, in £1 ordinary shares, beyond the registered capital of £33,200. At 18th May, 1950, the Metropolitan-Vickers Electrical Co., Ltd., held practically all the issued shares.

LIQUIDATIONS

L. Bunce (Electrical), Ltd.—A meeting of creditors was held recently at Dudley when a statement of affairs was submitted which showed liabilities of £7,022, and net assets of £6,527 leaving a deficiency as regarded creditors of £494. So far as the contributories were concerned there was a total deficiency of £11,923. The voluntary liquidation of the company was confirmed with Mr. D. Tanfield, of Wall & Tanfield, Chaddesley House, 196, Wolverhampton Street, Dudley, as liquidator, and a committee of inspection was appointed.

Blythe & Marden, Ltd.—Winding up voluntarily. Liquidator, Mr. A. W. Hunter, 185-188, High Holborn, London, W.C.1.

BANKRUPTCIES

J. Bannister, electrical contractor, 2, The Wiend, Wigan.—First meeting held 29th August at the Official Receiver's office, West Africa House, 25, Water Street, Liverpool. Public examination 12th October at the Court House, Crawford Street, Wigan.

G. Maddison, Church Street, Kidderminster, electrician.—First and final dividend of 7¾d in the £, payable 15th September at the Official Receiver's office, Somerset House, 37, Temple Street, Birmingham, 2.

R. D. Nichols, carrying on business at 9, Friary Street, Plymouth, as an electrical engineer under the name of the Eagle Electrical Engineering Co.—Receiving order made 17th August on debtor's own petition.

FINANCIAL SECTION

STOCKS and SHARES

THROUGHOUT the whole of August, Stock Exchange markets showed a resistance little short of surprising to the adverse factors operating against them. During the period of the war in Korea, prices of gilt-edged securities have gone ahead, not only steadily, but in some cases rapidly. The 3½ per cent issue of the British Electricity Authority, for example, which came out at 99, after keeping round about the offered price for some weeks, developed strength and rose to 3⅛ premium. British Transport "Threes" and others in the same group advanced considerably under the leadership of the 3½ per cent War Loan. No great astonishment was expressed when the market fell back in the early part of this week. Rumours of a possible extension of hostilities in the Far East brought about a reaction which spread to most parts of the House. The Electricity Stock gave way to 2⅜ premium. Other gilt-edged issues were similarly affected.

Prices and Reports

De la Rue shares at 23s are 2s 9d lower since a week ago. In the recent report, the directors forecast a new issue of capital which will enable the company to pay off its bank overdraft and to prepare for redemption of the £203,200 4½ per cent debenture stock which falls due for repayment in July next year. Ultra Electric 5s shares hardened to 3s 6d upon the result of the 1949-50 trading, which, as mentioned in last week's *Electrical Review* turned a group loss of £89,600 into a profit of £60,600. Thorn Electrical at 18s 9d. are 1s 3d higher, the company's net profit, for the twelve months ended 31st March last, £58,800, being about £7,000 better on the year. British Thermostat, 31s 3d, and Chloride Electrical, 57s 6d, are noticeably good spots.

Metal Industries went back to 41s 3d, although the group earnings are £80,000 up at £1,120,000. The dividend of 10 per cent is paid on an extra £45,000 capital as compared with a year ago: group assets increased from £8,600,000 to £9,925,000. The price of Electrical Components rarely changes; it has remained at 11s 3d for some time past. The dividend is maintained at 20 per cent and the chairman's statement contains a hint of a possible increase in the capital.

Aberdare Cables

Aberdare Cables rose 3s, to 60s, on statements made at the meeting last week, when the chairman expressed his opinion that the dividend would be maintained at 20 per cent for the full year. The £1 shares are about to be split into 5s shares, and dealings in the latter are thought likely to start towards the end of this week. The company aroused a little comment by declaring an interim dividend of 10 per cent, as against 12½ per cent a year ago, the latter being followed by 7½ per cent, making 20 per cent for the year. In his speech, the chairman mentioned that the results for the first nine months of the current financial year were not so good as those for 1949, but he said that they could be regarded as quite satisfactory and the final figures should enable a more substantial figure than that of last year to be carried forward in the 1950 accounts.

The Radio Group

Amongst the consequences of the Korean war has been a notable revival of prices and activity in the shares of the radio group. Prominent amongst these are Cossors, E. K. Cole, and Pye deferred. The last-named have risen to 33s 9d and E. K. Cole to 17s 3d. A. C. Cossor 5s ordinary shares have been changing hands as high as 9s 3d. They last received a dividend in August, 1947; the company's 6 per cent preference dividend is in arrears for more than two years. Nevertheless, people have been, and are still, buying Cossor ordinary in preference to Murphy Radio, also 5s shares, which can be obtained at 7s 6d. The Murphy company has a good record and, as mentioned here a fortnight ago, the dividend is expected to be maintained at 10 per cent.

Base Metal Rises

The Far East conflict has brought about remarkable rises in the prices of base metals—copper, lead, zinc and tin especially—and the question is often raised as to how far these new prices may affect the profits of industries of which these metals constitute the raw material. It is assumed, however, that the companies concerned in the purchase of metals and commodities take such steps as are calculated to compensate for the extra expenditure to which the rise in the metals, etc., commits them. Cable manufacturers and others closely interested in raw metal quotations are not thought likely to be disadvantaged to any extent by the extraordinary advances that have taken place, and, on this assumption, the prices of the shares in such companies have been unaffected so far by the boom in the base metal and commodity markets.

ITALIAN OVERSEAS TRADE

Large Increases in 1949

ALTHOUGH last year Italy's electrical imports increased substantially, they were greatly exceeded by her exports of such goods. Principal suppliers were the United States and Switzerland, and leading customers Argentina, Poland, U.S.S.R., Yugoslavia, Egypt and Germany. Values in millions of lire of the electrical import and export trade respectively in the main groups are shown in the accompanying tables, with notes of increases or decreases compared with 1948. The exchange value of the lira last year averaged 1,748 to the £.

IMPORTS

Class of Equipment	1949 (Million Lire)	Inc. or dec. on 1948 (Million Lire)
Generators and motors without commutators	386	+ 269
From Sweden	38	+ 27
„ *Switzerland*	40	+ 15
„ *United States*	230	+ 170
Ditto, with commutators	628	+ 505
From Sweden	56	+ 4
„ *Switzerland*	75	+ 48
„ *Germany*	232	+ 232
„ *Britain*	52	+ 45
Transformers, static	23	− 65
From Switzerland	8	− 61
Unspecified elec. apparatus	1,368	+ 675
From United States	719	+ 521
„ *France*	28	− 1
„ *Switzerland*	395	+ 2

EXPORTS

Class of Equipment	1949 (Million Lire)	Inc. or dec. on 1948 (Million Lire)
Generators and motors without commutators	1,683	− 999
To Argentina	355	− 461
„ *Poland*	230	+ 202
Ditto, with commutators	2,065	+ 546
To Argentina	607	+ 144
„ *U.S.S.R.*	608	+ 380
Transformers, static	1,514	+ 898
„ *Germany*	233	+ 233
„ *Argentina*	231	+ 116
Unspecified electrical apparatus	4,458	+ 1,073
To Argentina	303	− 217
„ *Yugoslavia*	532	+ 288
„ *Poland*	524	+ 300
„ *Egypt*	333	+ 126

DANISH ELECTRICAL TRADE

Great Britain the Largest Supplier

LAST year Denmark's electrical exports were rather above the level of her imports. They showed an increase in value on 1948 of a little over one-fifth, while imports rose in value by slightly less than one-fifth. Particulars of the chief groups in 1949 are given in the accompanying tables. Denmark's increased exports of cable and wire and installation material generally are noteworthy.

The largest supplier of electrical imports as a whole was the United Kingdom with about 40 per cent of the total trade and an advance of approximately the same percentage on 1948. Holland, the United States, Sweden, Switzerland and Belgium also shared in the business. Leading customers were Norway, Sweden, Finland, and Holland. [£1 = 19·20 Danish Kr.]

EXPORTS

Class of Equipment	1949 Kr. (000)	Inc. or dec. on 1948 Kr. (000)
Dynamos, motors, convertors, etc.	6,700	+ 1,601
Battery parts	7,250	+ 884
Accumulators and parts	270	− 388
Incandescent lamps	340	+ 36
Radio valves	300	+ 77
Radio material	8,960	+ 319
Telegraph and telephone material	1,850	+ 765
Cable and wire	6,620	+ 4,527
Vacuum cleaners	2,490	+ 705
Electrical porcelain	4,125	+ 1,309
Installation material	16,825	+ 2,396
Elec. material unspecified	430	− 7,719

IMPORTS

Class of Equipment	1949 Kr. (000)	Inc. or dec. on 1948 Kr. (000)
Dynamos, motors, convertors, etc.	15,325	+ 3,140
Accumulators	540	+ 201
Incandescent lamps	5,290	+ 1,133
Radio valves	2,950	− 919
Radio material	2,420	− 1,445
Telegraph, telephone and radio transmitting apparatus	8,660	+ 3,428
Cable and wire	1,410	− 894
Vacuum cleaners	240	+ 141
Elec. apparatus unspecified	2,450	− 9,965
Electrical porcelain	160	− 12
Installation material	4,780	+ 1,029
Other electrical material	700	− 2,704

ELECTRICITY SUPPLY

Manchester District Heating Scheme

Belfast Engineer's Report

THE Manchester Corporation's district heating scheme for Wythenshawe will now have to be abandoned owing to the refusal of the Ministry of Fuel and Power to intervene on the price to be paid by the B.E.A. for the residual electricity which would be produced. The Ministry had previously intimated that the Government could not give financial help.

Blackpool Illuminations

The illuminations at Blackpool, which will be switched on for thirty-nine nights from 15th September, will comprise six miles of lights. Three hundred thousand bulbs will be used and a third of the tableaux will be new features. The cost of the illuminations will be £55,000.

Scottish Tariff Adjustment

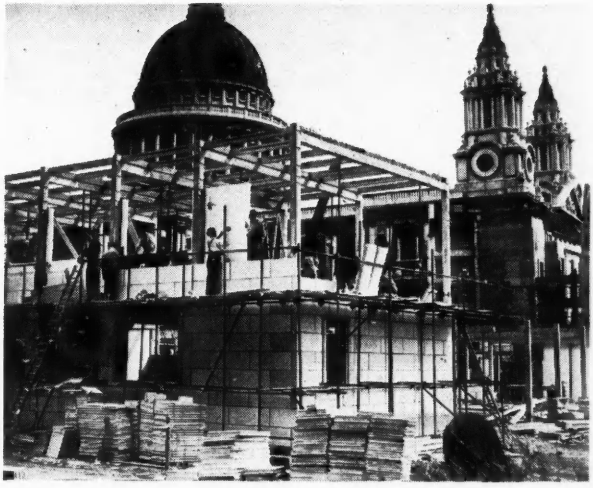
The North of Scotland Hydro-Electric Board has added a fourth block at ½d per kWh to the existing domestic and non-residential tariffs. This cheap rate was introduced last winter as an experiment in areas served by isolated water power stations, and the Board has decided to extend the experiment in order to ascertain the effect of the new rate on load factor and maximum demand. The concession applies to almost the whole of the mainland part of the Board's area, including Dundee, Aberdeen, Perth and Inverness, but not to the islands and mainland districts where electricity is generated wholly or mainly by diesel plant. The new rates will apply during the next two winter quarters. At present, the domestic tariff in the areas benefiting by the reduced rate is 5½d per kWh, which normally covers the cost of electricity used for lighting, 1d per kWh for cooking and ¾d per kWh for more extensive use. The new tariff will benefit particularly consumers who use water heaters, fires and cookers.

Southport's Lighting

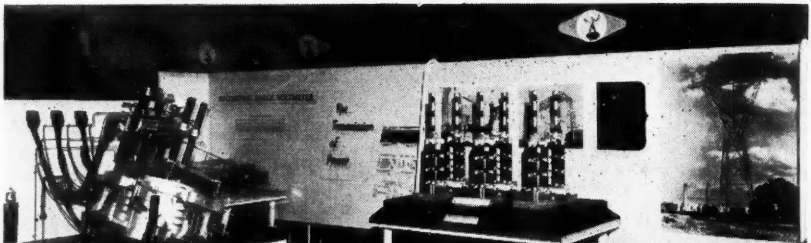
Southport Corporation Lighting Department's new headquarters in Shakespeare Street were officially opened recently by the Mayor, who also switched on new sodium lamps erected at a cost of £6,000, in Lulworth Road and Waterloo Road. Councillor A. H. Allen, chairman of the Lighting Committee, said that this was the first step in a major lighting scheme.

B.E.A. Temporary Control Room

The accompanying picture shows work on the construction of the new control room of the British Electricity Authority in Paternoster Square, London, E.C.4,



Work proceeding on the temporary control room of the B.E.A. in Paternoster Square



An electric arc furnace is prominent in this electrical section of the "Energy in the Service of Man" Exhibition running in connection with the British Association meeting at Birmingham

with St. Paul's Cathedral in the background. This prefabricated building will be used until the Bankside power station is ready when the control room will be transferred to Bankside.

Lakeland Electricity

In their "Report and News Letter" for August the Friends of the Lake District set out details of the proposed Eskdale and Duddon Valley hydro-electric schemes, to which they are strongly opposed. Reference is also made to the possibility of the erection of overhead lines in the Lake District. It is conceded that "electricity is a right and proper claim of those who live there," and any extra cost of distribution imposed by placing lines underground should not fall on them but should be defrayed from national funds.

Progress at Belfast

In his report for the year ended 31st March, Mr. W. J. McC. Girvan, Belfast city electrical engineer and manager, states that in addition to the 30,000 kW turbo-alternator and associated boiler plant officially put into service at the Harbour power station in December last, plant of similar capacity is on order and building work on site is progressing. The Ministry of Commerce is shortly to issue a scheme providing for the installation on a site on the West Twin Island of a new generating station with an initial capacity of 60,000 kW, and negotiations are in progress. Work is proceeding on the construction of a main switching station at Mountpottinger.

During the year the Harbour power station generated 319 killion kWh (9.51 per cent more than in the previous year) and used 201,404 tons of coal, the average cost of which (57s 7d per ton) was 160.7 per cent higher than in 1939 and 0.82 per cent higher than last year. Sales of electricity in the Corporation's area of supply rose by 10.68 per cent to 315 million kWh, and 7,023 new consumers were connected. Change-over from d.c. to a.c. was carried out in the case of 3,218 consumers.

After deducting discounts and bad debts, revenue amounted to £1,642,412 and there was a net surplus of £117,160. Capital expenditure during the year totalled £966,357.

Americans to Build Australian Dam

From nine tenders, four of them from British concerns, for the construction of the large Eildon Dam, the Government of Victoria has accepted that of the Utah Construction Co. (U.S.A.). The dam, which will cost over £9 million sterling, is the centre of a water and power supply scheme based on the Goulburn River, about 60 miles north of Melbourne.

Large Russian Scheme

It is announced from Moscow that work is to start shortly on a 2,000,000 kW hydro-electric station near Kuibyshev, on the Volga. It is designed to provide power to Moscow and other cities and for railway electrification, and an irrigation scheme is associated with it.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specifications (2s each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1944

10494. General Electric Co., Ltd., and Jesty, L. C.—Television and like apparatus. 11th May, 1949. (643961.)

1945

2980. Foulds, Ltd., E. A., and Foulds, W. G.—Fast and slow speed driving means for electric lifts and the like. 6th March, 1946. (643963.)

21458. General Electric Co., Ltd., Hill, R. T. J., and Whibley, R. H.—Cathode-ray tubes. 11th March, 1949. (643966.)

24822. Igranic Electric Co., Ltd.—Electrical contacts. 25th September, 1945. (643967.)

1946

5271. Freese, H., and Claesson, P. H. E.—Private telephone exchange systems. 20th February, 1946. (643973.)

17621. British Thomson-Houston Co., Ltd.—High-frequency electric discharge apparatus. 12th June, 1946. (644202.)

21485. British Thomson-Houston Co., Ltd., and Walker, J. H.—Dynamo-electric machines. 14th January, 1948. (643977.)

21670. Standard Telephones & Cables, Ltd., and Kelly, R.—Electrical power supply equipment. 18th July, 1947. (643978.)

22998. Sperry Gyroscope Co., Inc.—Switching commutating or modulating means for electromagnetic wave-guides. 1st August, 1946. (643979.)

23099. Standard Telephones & Cables, Ltd.—Television transmission systems. 2nd August, 1946. (644123.)

23100. Standard Telephones & Cables, Ltd.—Electric pulse receivers. 2nd August, 1946. (644124.)

25867. Sperry Gyroscope Co., Inc.—Electromechanical wave-guide modulators or switches. 28th August, 1946. (643981.)

26210. Standard Telephones & Cables, Ltd.—Frequency selective amplifier circuits. 30th August, 1946. (644204.)

26671. Philips Lamps, Ltd.—Piezo-electric apparatus. 5th September, 1946. (643983.)

27158/9. Aircraft Radio Corporation.—Wave-guides, 10th September, 1946. (643984/5.)

28683. Sperry Gyroscope Co., Ltd., and Thomas, E. L.—Electrical devices for measuring phase difference. 25th September, 1947. (Cognate application 28684, 25th September, 1946.) (644205.)

35529. Vltavsky, V.—Extrusion apparatus for producing cable insulation, profiles, rods, threads, and the like from plastic materials. 30th November, 1946. (643990.)

36854. Igranic Electric Co., Ltd.—Control systems for polyphase alternating-current motors. 13th December, 1946. (643992.)

1947

926. Murphy Radio, Ltd., and Fairhurst, H. A.—Sawtooth current generators. 8th October, 1948. (643993.)

2881. Muirhead & Co., Ltd., Muirhead, F. H., and Bell, J. — Speed control of asynchronous electrical machines. 30th January, 1948. (643996.)

3441. Standard Telephones & Cables, Ltd., and Garfield, W. L. — Electrical measuring and indicating equipment. 30th January, 1948. (643997.)

3985. Soc. Française Radio-Electrique.—Radio altimeters. 11th February, 1947. (643998.)

8462. Kolster Brandes, Ltd., Lock, C. E., and Cundy, R. W.—Supporting means for cathode-ray oscillograph tubes. 25th March, 1948. (644009.)

9066. Standard Telephones & Cables, Ltd.—Telemetering system. 3rd April, 1947. (644128.)

10319. Bull, C. S.—Secondary-electron-emitting discharge devices. 19th March, 1948. (644012.)

11263. British Thomson-Houston Co., Ltd.—Convertors and other electrical apparatus with rotating commutator. 28th April, 1947. (644014.)

12474. Sletner, P. G.—Electric heating cables. 8th May, 1947. (644018.)

18099. General Electric Co., Ltd., and Smart, N. C.—Electric impulse counting devices. 10th March, 1948. (644041.)

18177. Smith Manufacturing Co., Inc., F. A.—Snap-action thermostatic element and method of making the same. 9th July, 1947. (644130.)

18843. Philips Lamps, Ltd.—Noise-suppression circuits for frequency-modulation receivers. 15th July, 1947. (644044.)

19277. Standard Telephones & Cables, Ltd.—Systems for reproducing television images. 18th July, 1947. (644047.)

20659. Westinghouse Brake & Signal Co., Ltd.—Light signals. 30th July, 1947. (644052.)

20842. Marconi's Wireless Telegraph Co., Ltd., and Poulter, T. G.—Motor control arrangements for printing telegraph receivers. 25th March, 1948. (644053.)

21654. Mines Domaniales de Potasse d'Alsace.—Remote control devices for electrical apparatus. 7th August, 1947. (644058.)

21704. Scophony, Ltd., and Wikkenhauser, G.—Television and like receivers 4th August, 1948. (644059.)

21931. Standard Telephones & Cables, Ltd.—Vehicle communication and location indicating system. 8th August, 1947. (644061.)

22006. Askania Regulator Co.—Control systems for alternating current motors. 8th August, 1947. (644133.)

22042. Allis-Chalmers Manufacturing Co. — Rotary shaft seal. 8th August, 1947. (644062.)

22737. General Electric Co., Ltd., Humphrey, R., and Hunt, M. H.—Thermostats. 4th August, 1948. (644063.)

23962. Telephone Manufacturing Co., Ltd., and Paddle, L. H.—Electric wave systems. 25th October, 1948. (Cognate application 27036, 8th October, 1947.) (644136.)

24348. Marconi's Wireless Telegraph Co., Ltd., and Ramsay, J. F. — Radio lenses. 3rd August, 1948. (644065.)

24652. Standard Telephones & Cables, Ltd., Feldhusen, I. V., and Secker, B. — Adjustable electric attenuators. 3rd September, 1948. (644066.)

25066. Standard Telephones & Cables, Ltd., and Dunn, R. H.—Gas tube counting circuits. 10th September, 1948. (644067.)

25138. Murphy Radio, Ltd., and Kidd, P. C.—Obtaining a high unidirectional voltage from an electronic oscillation generator. 13th September, 1948. (644037.)

25417. Brucker, J.—Operating handle with position indicator for rotary electric switches. 17th September, 1947. (644068.)

26281. Berthiez, C. W.—Electromechanical device for pre-selecting and controlling the speed of one or more electric motors driving movable machine parts. 29th September, 1947. (644070.)

27260. Aktiebolaget Ljungstroms Angturbin.—Elastic fluid turbines. 10th October, 1947. (644074.)

27580. Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz.—Shaft couplings employing hysteresis effects. 14th October, 1947. (644073.)

28432. Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Switching devices for use with electrically driven gramophones. 24th October, 1947. (644141.)

28513. Marconi's Wireless Telegraph Co., Ltd., and

Easter, B.—Diversity signal receivers. 24th October, 1947. (644076.)

29924. Régie Nationale des Usines Renault.—Electric starters for heavy-oil internal combustion engines. 10th November, 1947. (644079.)

30125. Lumalampan Aktiebolag.—Holder devices for end-capped electrical discharge tubes provided with control switches. 12th November, 1947. (644080.)

31495. Ferranti, Ltd., and Walker, D. F.—Variable impedance devices. 27th November, 1948. (644082.)

31848. Marconi Instruments, Ltd., and Brockelsby, C. F.—Electronic oscillation generators. 25th November, 1948. (644083.)

31860. Smith, A. J.—Electronic control apparatus. 3rd January, 1949. (644084.)

32261. Automatic Telephone & Electric Co., Ltd., and Spears,, R. A.—Thermionic valve oscillation generators. 23rd November, 1948. (644086.)

1948

317. Philips Electrical, Ltd.—Devices for transmitting or producing ultra-high-frequency electrical oscillations. 5th January, 1948. (644095.)

649. British Thomson-Houston Co., Ltd.—Projection television receivers. 8th January, 1948. (644152.)

773. British Thomson-Houston Co., Ltd.—Magnetic cores. 9th January, 1948. (644097.)

3545. Standard Telephones and Cables, Ltd.—Two-way radio communication systems. 6th February, 1948. (644106.)

4301. Standard Telephones & Cables, Ltd., and Gibson, W. T.—Electric signal transmission circuits with automatic level control. 4th February, 1949. (644107.)

4481. Holophane, Ltd. (Holophane Co., Inc.).—Street lighting luminaires and refractors therefor. 16th February, 1948. (644109.)

4672. Baird, Ltd., J. L., and Anderson, E. G. O.—Electronic amplifier circuits. 17th March, 1949. (644110.)

5097. Western Electric Co., Inc.—Telephone systems. 20th February, 1948. (644112.)

5979. Department of Commerce, Director of the Office of Technical Services.—Apparatus for balancing electric transmission lines. 27th February, 1948. (644161.)

6099. Dehn, S. G. (Sunbeam Corporation).—Electric motor for shaver and the like. 27th February, 1948. (644163.)

6830. General Electric Co., Ltd., Clack, B. N., and Harris, N. L.—Devices for generating ultra-high-frequency electrical oscillations. 4th March, 1949. (644165.)

7881. Sprague Electric Co.—Electrical conductors. 16th March, 1948. (644167.)

9506. Philips Electrical, Ltd.—Low-frequency amplifying circuit arrangements. 5th April, 1948. (644174.)

11114. Radio Gramophone Development Co., Ltd., Duffell, H. F., and Bolus, S. T.—Electric transformers particularly for currents at audio frequencies. 21st April, 1949. (644222.)

11517. American Safety Table Co., Inc.—Electric motor and transmission unit for sewing-machines and the like. 27th April, 1948. (644223.)

11534. Philips Electrical, Ltd.—Low-frequency amplifier arrangements. 27th April, 1948. (644180.)

13046. British Thomson-Houston Co., Ltd., and Maggs, A. H.—Dynamo-electric machines. 20th April, 1949. (644183.)

13707. Anglo-Iranian Oil Co., Ltd., and Hayhurst, H.—Electromagnetically operated switch-actuating devices. 20th June, 1949. (644229.)

16403. English Electric Co., Ltd., Ball, R. D., and Binney, E. A.—Dynamo-electric machines. 17th June, 1949. (644192.)

18278. Flight, T. N., Wilson, W. H., and Chinn, A. J. — Rotary electric switches. 7th July, 1948. (644197.)

20159. Expanded Metal Co., Ltd., and Knight, W. F.—Electrical resistances. 21st June, 1949. (644245.)

21422/3. British Thomson-Houston Co., Ltd.—Vacuum cleaners. 13th August, 1948. (644260/1.)

22840. M-O Valve Co., Ltd., and Clack, B. N.—Electric circuits which include TR switches. 10th June, 1949. (644262.)

23580. Schneider, H. W.—Actuating means for electrical switches. 7th September, 1949. (644265.)

23971. Smellie & Partners, Ltd., J. H., and Smellie, J. H.—A.c. motors for cranes and other load raising and lowering apparatus. 8th September, 1949. (644268.)

25214. Ekco-Ensign Electric, Ltd., and Stickley, W. A.—Electric-discharge-lamp circuits. 28th September, 1949. (644274.)

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objection may be entered within a month from 23rd August:—

KOOLOHM. No. 676,935. Class 9. Electrical resistors.—Sprague Products Co. Inc. Massachusetts, U.S.A. Address for service: C/o Page, White & Farrer, 27, Chancery Lane, London, W.C.2.

AUTOTRON. No. 677,838. Class 9. Electronic instruments and parts thereof, all included in Class 9; and photo-electric register controlling apparatus for use in colour printing, and parts of such apparatus included in Class 9.—J. F. Crosfield, Ltd., 56, Northway, London, N.W.11.

KIENZLE (design). No. B681,223. Class 9. Electric time switches, calculating apparatus, electricity meters, etc.—Chronotechna, Závody na Vyrobu Hodin, Národni Podnik (Chronotechna, Watch Factory, National Cpn), Czechoslovakia. Address for service: C/o Reddie & Grose, 6, Bream's Bldgs., London, E.C.4.

Design. No. 685,650. Class 9. Wireless transmitting and receiving apparatus and instruments, electro-acoustic apparatus and instruments (not for medical or surgical purposes), etc. No. 685,652. Class 11. Electric lighting installations and parts thereof included in Class 11.—Tesla, Národni Podnik, Czechoslovakia. Address for service: C/o Reddie & Grose, 6, Bream's Bldgs, London, E.C.4.

DRYDENAIR. No. 688,014. Class 11. Electric radiators.—Thomas Dryden & Sons, Ltd., Grimshaw Street, Preston, Lancs.

U.D.E.C. (design). No. 689,232. Class 11. Installations for refrigerating—U.D. Engg. Co., Ltd., Abbey Works, Cumberland Avenue, Park Royal, London, N.W.10.

Transport in N.E. London

A DELEGATION from the Joint Conference of Local Authorities in North London recently met the Minister of Transport to urge that work should begin on the electrification of the Churchbury loop from Cheshunt to Edmonton and of the Eastern Region suburban services to Enfield Town and Chingford from Liverpool Street Station, and on the construction of the proposed new tube from South Tottenham to Victoria. Mr. Barnes said he hoped soon to be able to indicate whether these proposals fell within a group of schemes which he was endeavouring to separate from the London Plan and which could proceed independently and without detriment to that plan as soon as the capital investment was possible.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section, the date of the issue is given in parentheses.

Australia. — MELBOURNE. — 27th September. State Electricity Commission of Victoria. Steel and timber lifting masts. (See this issue.)

Darlaston.—8th September. U.D.C. Installation of electric light and power in 145 pre-war Council houses (deposit: £2 2s). Surveyor, 49, Church Street.

Downham.—6th September. R.D.C. Vertical spindle centrifugal pump, with motor, etc., for the conversion of plant to electrical drive (deposit: £5). Particulars from Silcock and Simpson, engineers, 10, Park Row, Leeds, 1.

Dundee.—7th September. City Council. Electric lighting, ventilating and power installation at the Albert Institute. Particulars from the City Quantity Surveyor, 21, City Square.

Egypt.—30th November. Department of Mines (Fuel Affairs). Diesel pumping plant. (See this issue.)

Heywood.—15th September. Borough Council. Electric paper baler, and overband magnetic separator and refuse handling plant for the Destructor Works, Peel Lane. Particulars from W. H. Jewell, manager.

Kidderminster.—22nd September. Corporation. Domestic electrical installations in 332 houses on various estates. (See this issue.)

Newcastle-upon-Tyne. — 16th September. Education Committee. Installation of electric lighting at Benton Park Primary School. (See 18th August issue.)

New Zealand.—DUNEDIN.—20th September. Corporation. Six 300 kVA, six 200 kVA and six 150 kVA distribution transformers. (C.R.E. (I.B.) 62599/50. Ten/1563.)*

WELLINGTON.—3rd October. Post and Telegraph Department. Submarine telephone cable. (CRE(IB)62682/50. Ten/1560).*

Salford.—18th September. City Engineer's Department. Electrical installations in four shops, four maisonnettes and 259 flats. (See 25th August issue.)

Sunbury-on-Thames.—4th September. U.D.C. Wiring and equipping for electricity sixty-two houses on three sites. Architect, Council Offices.

Syria.—ALEPPO.—14th October. Ministry of Public Works and Communications. Pumping and generating units. (CRE(IB) 62294/50. Ten 1554).*

Tangiers.—11th October. Telephone Co. of Tangiers. 1,000 telephone instruments. (C.R.E. (I.B.) 62688/50. Ten/1571.)*

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, S.W.1 (Victoria 9040).

ORDERS PLACED

Birkenhead.—Corporation Markets & Baths Committee. Electric lighting works at the Livingstone Street baths (£453).—Merseyside & North Wales Electricity Board.

Deptford. — Borough Council. Fluorescent lighting fittings for the Central Library (£445).—General Electric Co., Ltd.

Houghton-le-Spring. — U.D.C. Electrical wiring of fifty-four houses at the Fence Houses site.—B. L. Oliver, Birtley & Co.

Longbenton (Northumberland).—U.D.C. Electrical installations in 76 houses at Crossley Terrace, 30 houses on the Fordley estate and 136 houses at Dudley.—J. G. Patton, Newcastle-on-Tyne.

Manchester.—Corporation. Electrical installations at the Whitworth Buildings, of the Openshaw Technical School and at Margaret Barclay Residential School.—Casson Electric Co., Ltd. Electrical installations in 118 houses at Bank House Farm, Blackley.—E. M. Evans & Son.

Electrical installations in houses at Woodhouse Park and Moss Nook: A. E. Sudlow & Co., Ltd. (276 houses); S. B. Wainright & Co., Ltd. (157); E. M. Evans & Son, Ltd. (132); and H. C. Taylor & Co. (232).

Morpeth.—Corporation. Electrical installations in fifty-seven houses in Spelvit Lane.—J. & A. Oliver.

Newbury.—Corporation. Renewal of electrical installation at Corn Exchange (£1,971).—P. J. Hewett (Newbury), Ltd.

West Sussex.—County Council Education Committee. Renewal of electrical installation at Midhurst Grammar School (£684).—R. & P. Electrical Co.

CONTRACTS IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Avonmouth. — Research laboratories; The Imperial Smelting Corporation, Ltd., St. Andrews Road.

Barnstaple.—Reconstruction of Albert Hall (£25,000); borough surveyor, The Castle.

Battle (Sussex).—Permanent houses (35), Netherfield, for R.D.C. A. H. Neave, architect, 38, Mount Street.

Birkenhead.—Houses (64) Wood Lane; Fortus Construction Co., Ltd., 2, Rigby Street, Liverpool.

Birmingham.—Propose maternity and child welfare centre at Ridgacre Rd.; civic restaurant, Stratford Road, Sparkbrook; city engineer.

Bournemouth. — Rebuilding Departmental

Store, Old Christchurch Road and Hinton Road, J. E. Beale, Ltd., Old Christchurch Road.

Bromborough.—New administrative block for Lever Bros., Ltd., Port Sunlight; Holland, Hannen & Cubitts, Ltd., Liverpool (extension to contract).

Bromsgrove.—County primary schools, The Lickey; Nicol, Nicol and Thomas, architects, 111, New Street, Birmingham.

Bulwell.—Infants' school at Cantrel Rd.; Notts county architect, E. W. Roberts.

Cardiff.—Rebuilding Stuart House, Churchill Way; the Eagle Star Insurance Co., Ltd., 1, Threadneedle Street, E.C.2.

Carlisle.—New school at Belah for E.C.; John Laing & Son.

Congleton.—Day nursery at foot of Park Hill on Congleton/Biddulph Rd.; borough surveyor C. Brown; Maternity block War Memorial Hospital; Manchester Regional Hospital Board, Sunlight House, Quay Street, Manchester.

Coventry.—Howes Lane Primary School for E.C.; W. H. Jones & Son, Longhurst Lane.

Cumberland.—Clinic at Millom (£12,000) Health centres at Whitehaven and Workington (£25,000 each). 30 nurses' homes on various sites; county architect, J. H. Haughan.

Doncaster.—Hotel, Marshgate; John Smith's Tadcaster Brewery Co., Ltd., High Street, Tadcaster. New wing to Art Gallery and Museum, for T.C.; city estates surveyor.

Edinburgh.—Two primary schools, Moredun Park (£120,000), and Southhouse Crescent (£160,000); city architect, City Chambers.

Ellesmere Port.—Two hundred and twenty-six non-traditional houses for U.D.C.; Holland, Hannen & Cubitts, Ltd., Liverpool.

Enfield.—Flats (48), Pevensey Avenue; Frank Lee, U.D.C. surveyor, 7, Little Park Gardens.

Flintshire.—New secondary schools at Penly & Saltney 1951-52 programme; county architect.

Gateshead.—Civic centre, Shopcote area; chief architect.

Glasgow.—Secondary school, Knightswood (£380,000); director of housing, 20, Trongate.

Hainault.—Dairy distributing depot; London Co-operative Society, Ltd., 54, Maryland Street, E.15.

Heywood.—Houses (40), Rose Hill Street; A. Middleton, borough surveyor.

Huntingdon.—Extensions to Alconbury Farm Institute, with 40 bedrooms, laboratories, dining room, kitchen, etc.; S. J. Hands, county architect, County Buildings.

Ilford.—Flats (111), Maypole Estate and Mossford Green State; K. F. B. Nicholls, town clerk, Town Hall.

Islington.—Flats and maisonnettes on sites at Holly Park, Highbury New Park, and Peots Road, for B.C.; E. C. P. Monson, architects, Finsbury Pavement House, E.C.2.

Lancaster.—Seventy-two houses at the Ridge Estate for T.C.; District Master Builders' Association (extension to contract).

Leamington Spa.—Forty-two houses at Tachbrook Rd. for B.C.; Edgar Crowder, Ltd., South Rd., Birmingham.

Leeds.—Erection of Moortown (Alwoodley) County Primary School for E.C.; W. J. Simms, Son & Cooke, Ltd., Nottingham.

London.—Deptford.—Block of 12 flats, St. Donnatts Road, for B.C.; H. V. Ashley & Winton Newman, architects, 3, Verulam Buildings, Gray's Inn, W.C.1.

St. Pancras.—Forty-four flats, Willingham Terrace, for B.C.; Thomas Sibthorp, architect, 27, Grosvenor Place, S.W..

Mansfield.—Infants' school, Eakring Road; W. Caparne Baldry & Gabb, architects, 30, Regent Street.

Newcastle-on-Tyne. — Three hundred and twelve houses on the Montagu Estate (£400,000); City architect, 18, Cloth Market. Roman Catholic Church, Thickham View; J. Glynn, 41, Derby St.

New Malden.—Aged persons' homes (£108,000) for Surrey C.C.; county architect, County Hall, Kingston-on-Thames.

Northants.—Secondary modern schools at Moulton, Towcester, Duston. Science block at Kettering Grammar School; county architect, J. Perkins.

Oldham.—Temporary buildings for Clarksfield Secondary Modern School; T. G. S. Smith, builder, 194, Yorkshire Street, Rochdale.

Plymouth.—Primary School, St. Budeaux, for E.C.; Louis de Soissons & Partners, architects, 11, The Crescent.

Ramsgate.—Houses (110) Newington Estate, for T.C.; borough surveyor.

St. Neots.—Technical school with laboratories, workshops, etc., and primary school, with kitchen, etc., for County E.C.; S. J. Hands, county architect, County Buildings, Huntingdon.

Salford.—Junior & Infant School at Summerville Rd. for E.C.; Harry Wimpenny & Son, Ltd., Clough Sawmills, Prestwich, Manchester.

Additional classrooms at Tootal Drive Primary School; Drye & Co., Ltd., Salford. New bank at Broad St. and Hankinson St. for Manchester & Salford Trustees Savings Bank; architects, J. W. Beaumont & Sons, Danlee Buildings, Spring Gardens, Manchester. New police headquarters (£16,000); city engineer, W. A. Walker.

South Shields.—Extensions to Sutherland Quay at Tyne Dock and provision of plant and electric cranes (£1,000,000); engineer, Tyne Improvement Commission, Berwick St., Newcastle.

Surrey.—Schools at Reigate, Chessington (Surbiton), Pollards Hill (Mitcham) and Ham (Richmond), for E.C.; county architect, Kingston-on-Thames.

Watford.—Omnibus and coach garage, Garston, for London Transport Executive; Leslie & Co., Ltd., St. James's House, Kensington Square, W.8.

Westhoughton.—Houses (50) at Hindley Estate; surveyor, F. H. Walker.

Wigan.—Twenty-four flats and eight shops at Worsley Hall; D. M. McKellan, borough engineer.

Wisbech.—Junior & infants' schools, Laverington Road, for Isle of Ely C.C.; R. D. Robson, county architect, County Hall, March.